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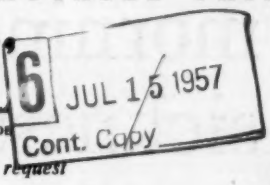

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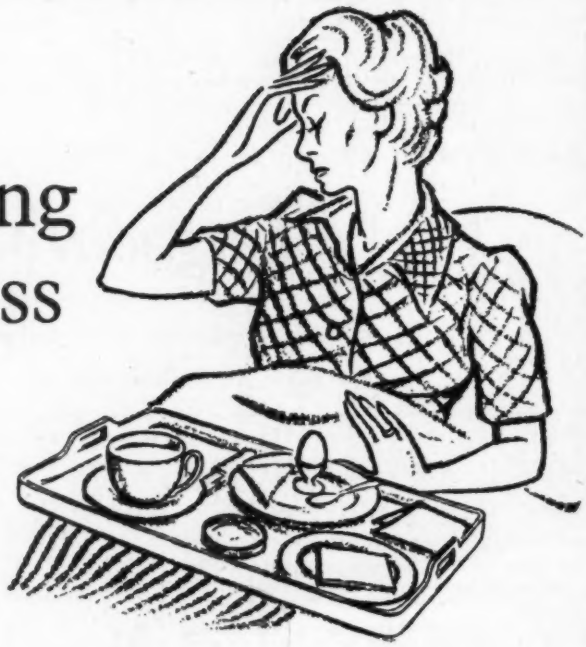

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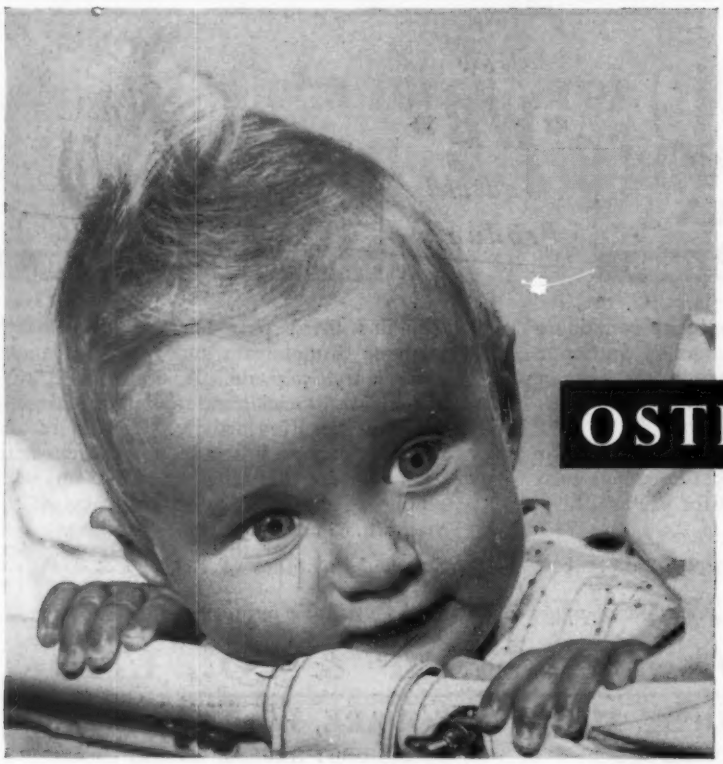

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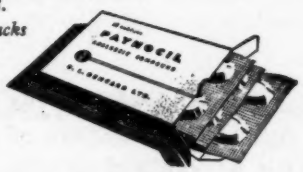

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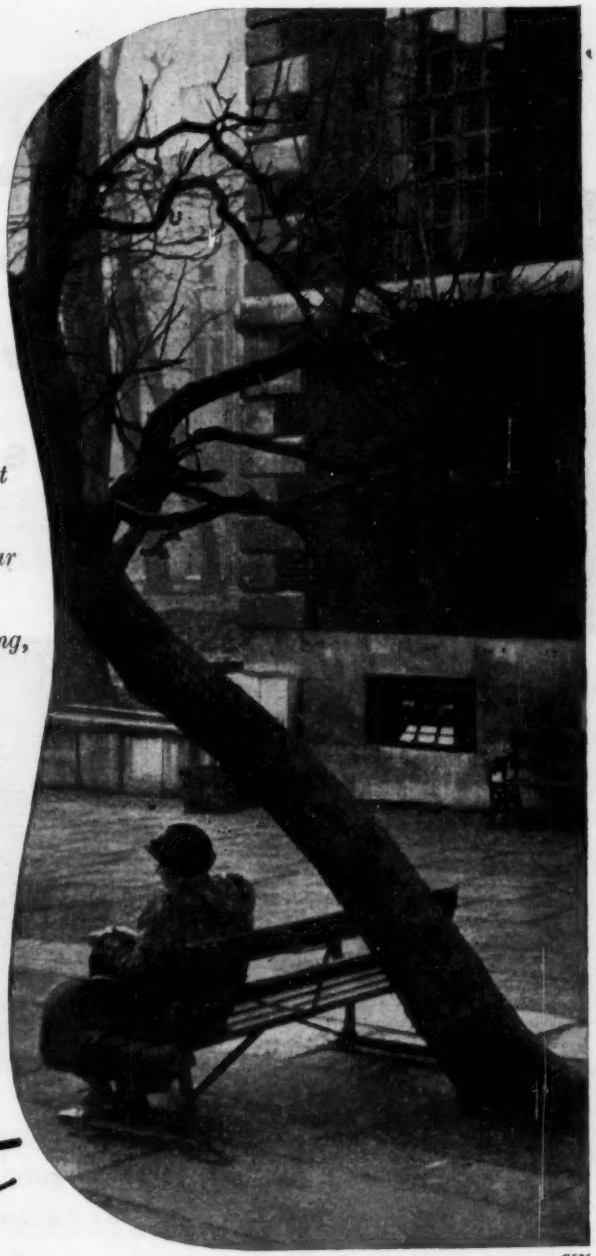

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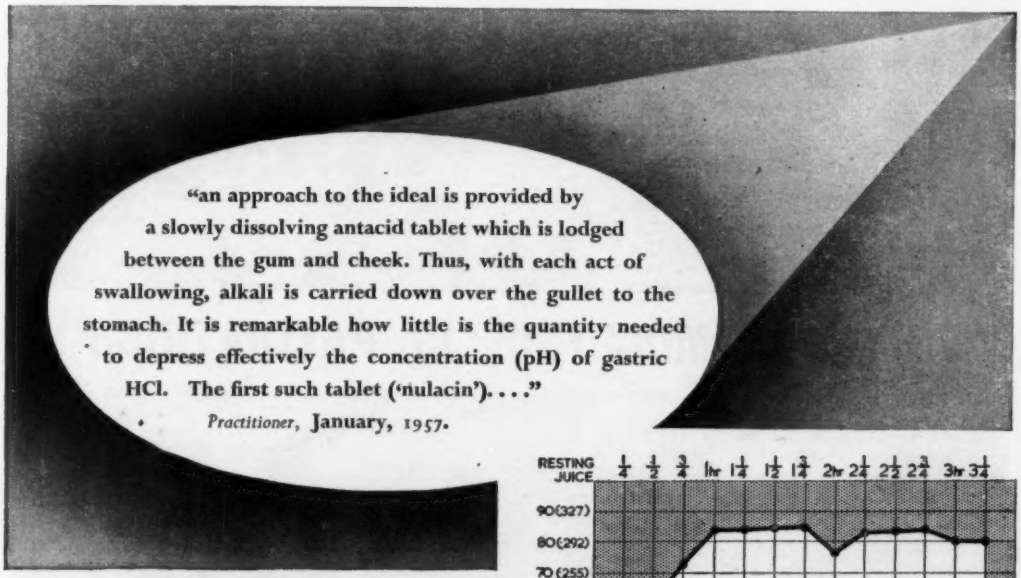
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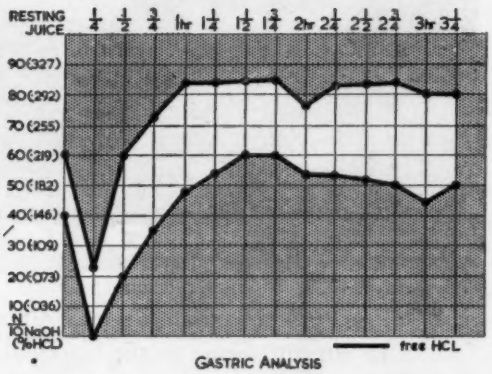

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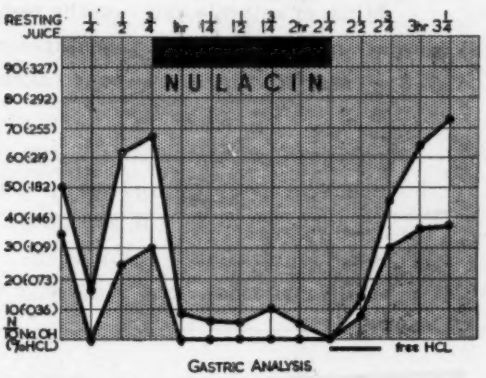

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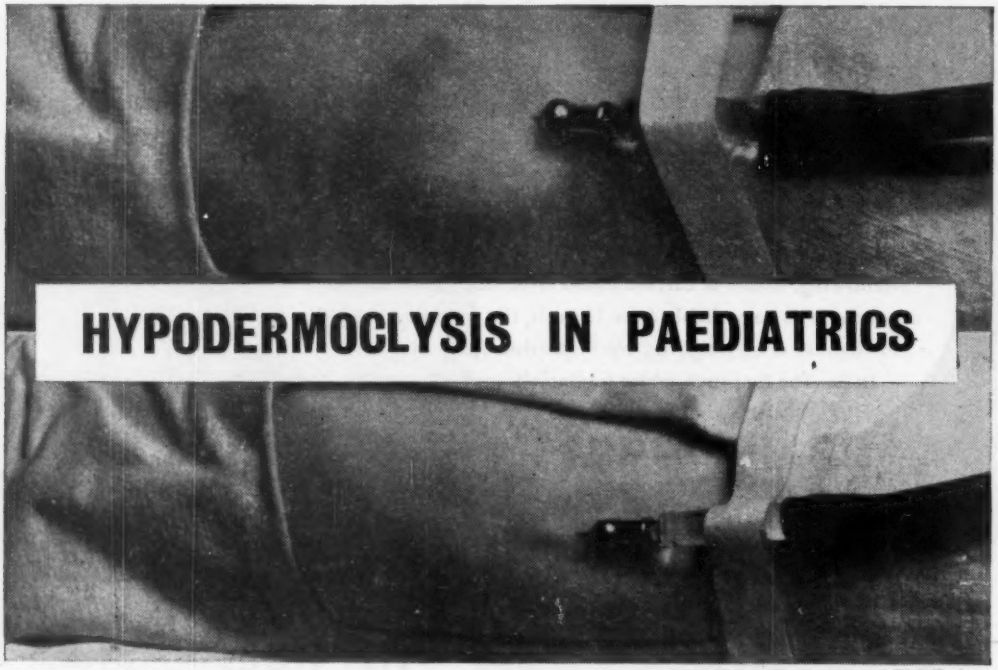

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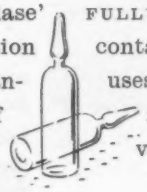

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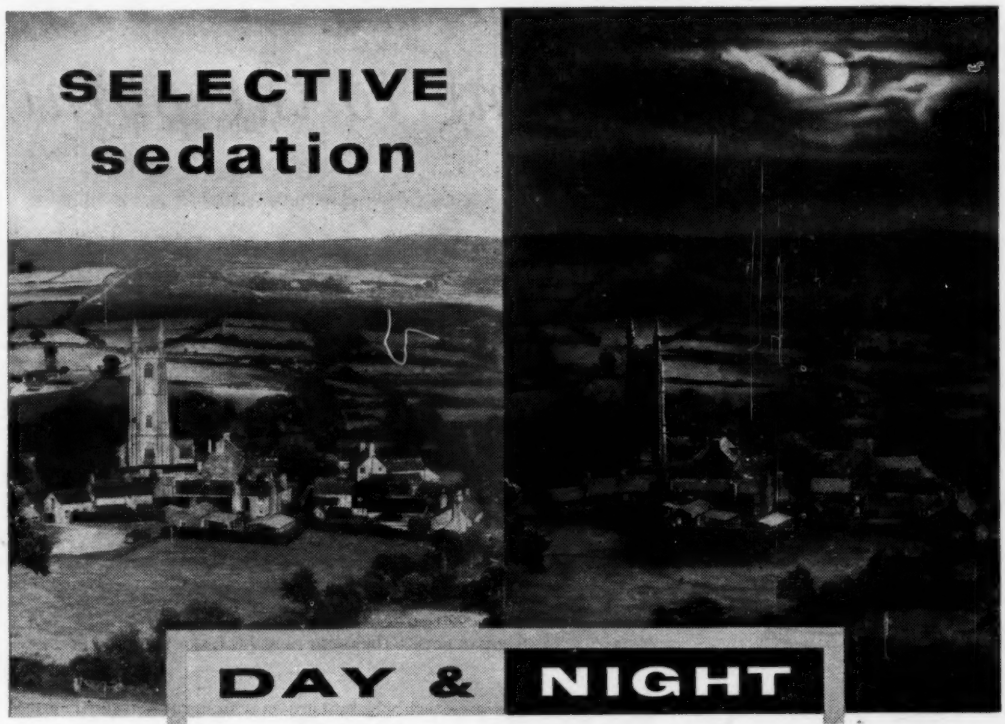

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with nasty long tails
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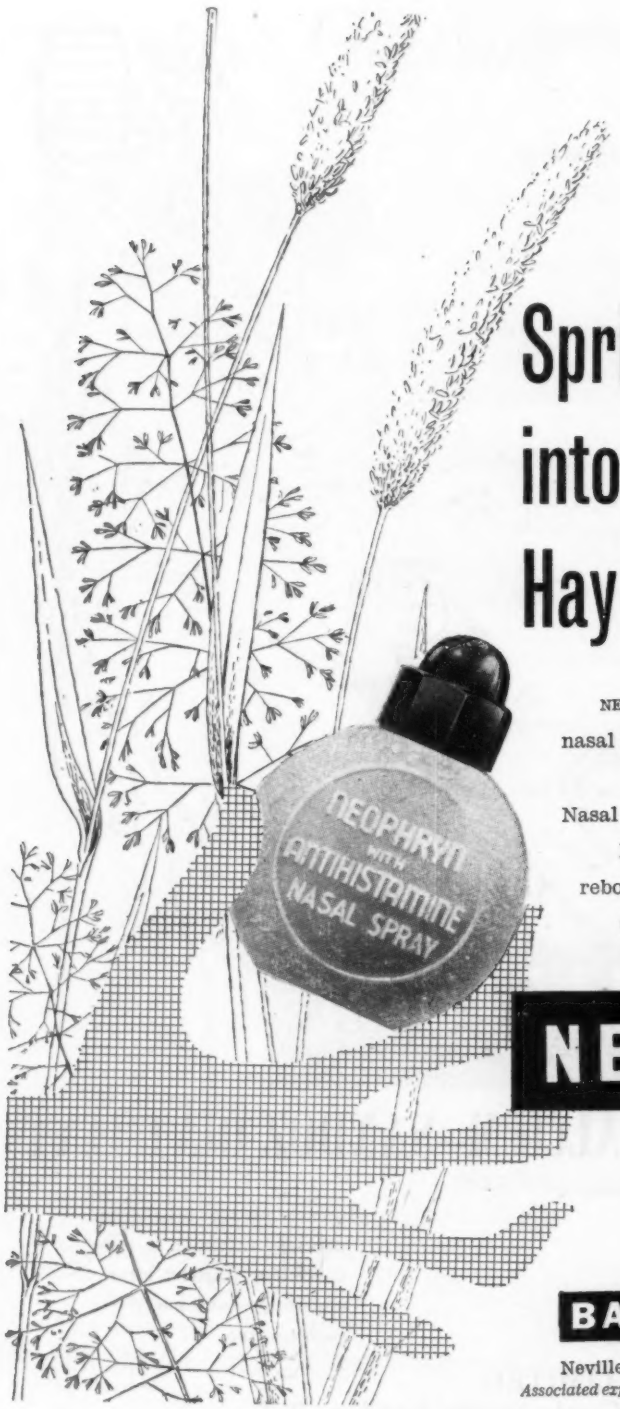

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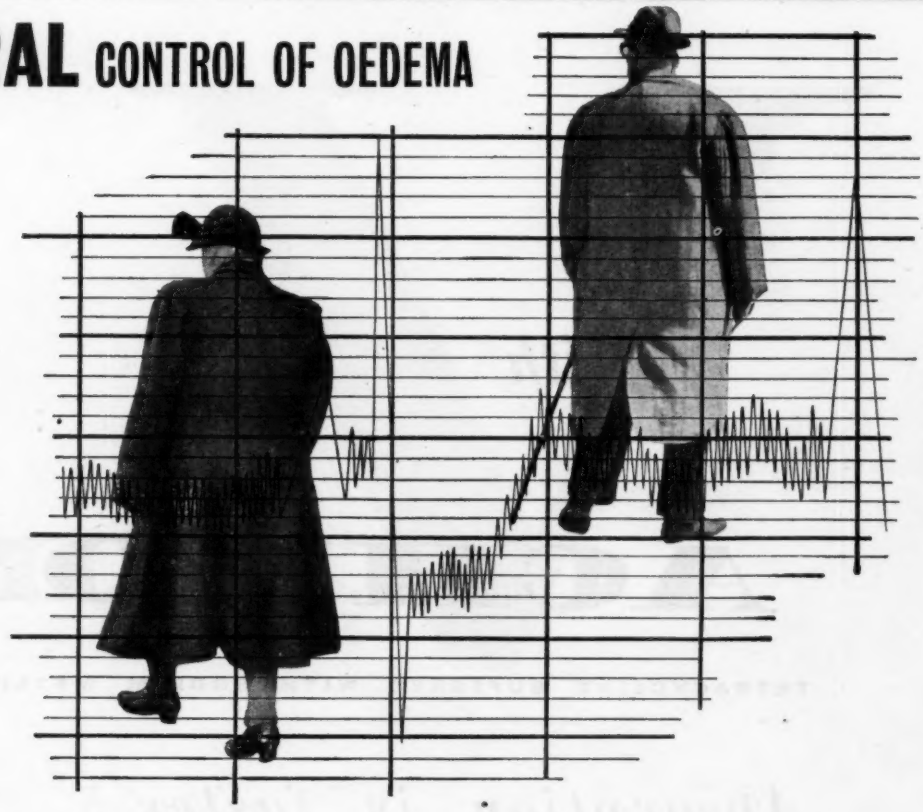

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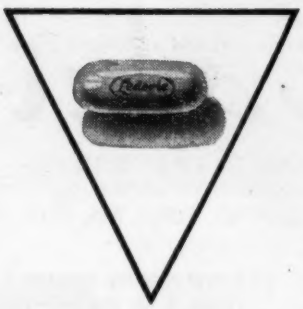

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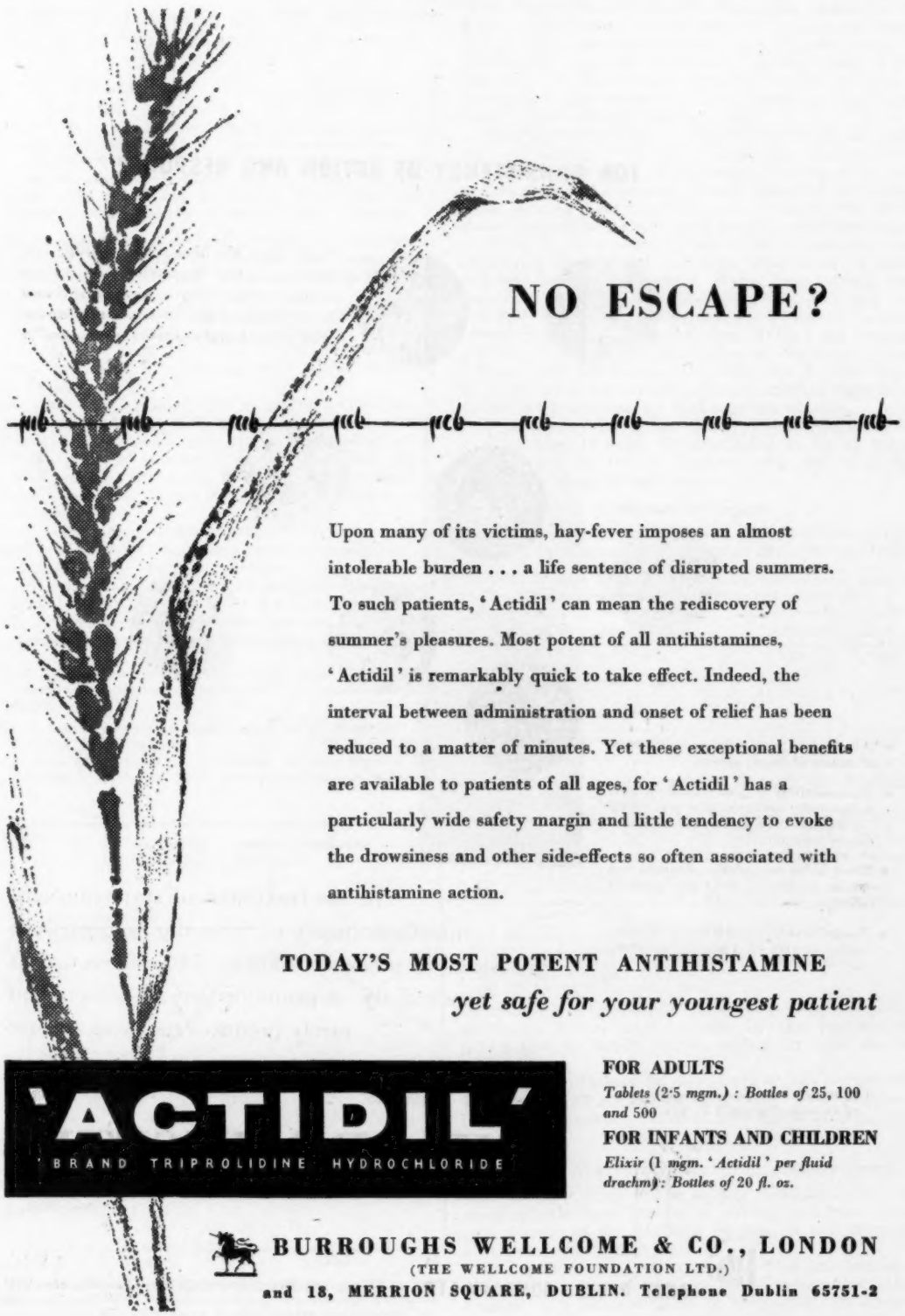

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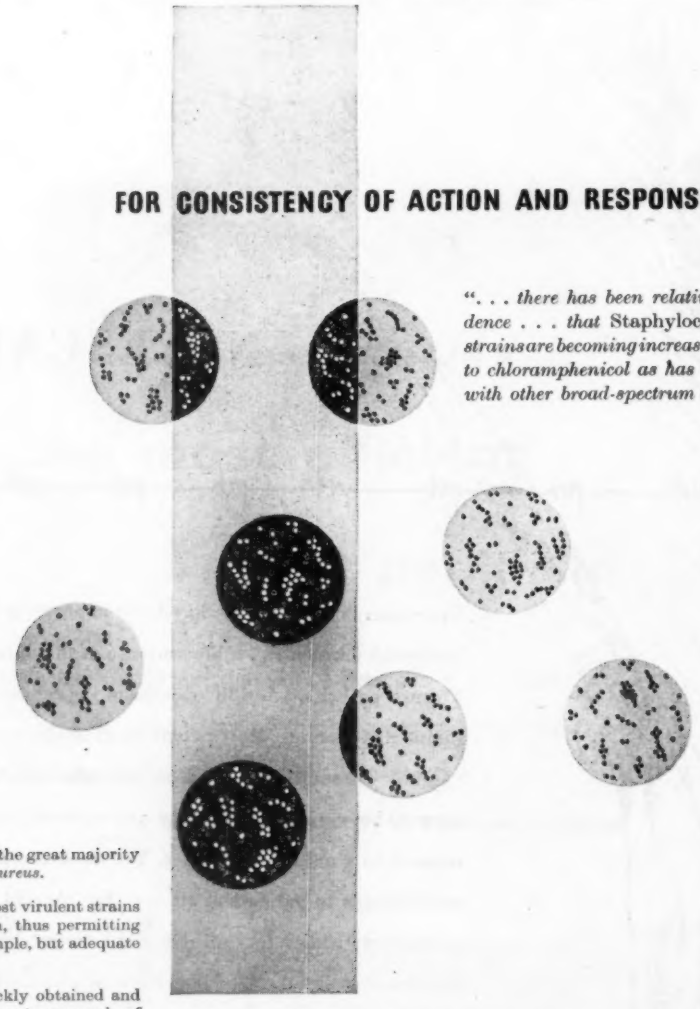

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† In Welch's *Principles and Practice of Antibiotic Therapy* N.Y. 1954.

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439

HÆMOLYTIC DISEASE OF THE NEWBORN

DEATHS IN ENGLAND AND WALES DURING 1953 AND 1955

W. WALKER * M.D. Durh.
LECTURER IN CHILD HEALTH IN THE UNIVERSITY OF DURHAM

P. L. MOLLISON B.A., M.D. Camb., F.R.C.P.
DIRECTOR, BLOOD TRANSFUSION RESEARCH UNIT, MEDICAL RESEARCH COUNCIL

From the Children's Department, Royal Victoria Infirmary, Newcastle upon Tyne, and the M.R.C. Blood Transfusion Research Unit, Postgraduate Medical School of London

THE increasing use of exchange transfusion has reduced the number of deaths from hæmolytic disease, but over the country as a whole the reduction has been less than was expected.

The correct use of exchange transfusion enables more than 95% of infants with hæmolytic disease to survive if born alive (Allen et al. 1950, Walker and Neligan 1955), whereas with simple transfusion only about 80% are likely to do so.†

Assuming that 1 in every 200 infants will have hæmolytic disease, and that 15% of affected infants will be stillborn, one can calculate the expected mortality, under different régimes of treatment, among those born alive: it is 0·85 per 1000 live births when simple transfusion is used but less than 0·2 when exchange transfusion is used exclusively.

Fig. 1 shows the changing mortality from hæmolytic disease over the past twenty-one years as recorded in the Registrar-General's Statistical Review.

In 1935–41 serological tests for hæmolytic disease were not available: this explains why the number of deaths ascribed to hæmolytic disease of the newborn is about half the number expected. From 1942 onwards the number of deaths registered as due to hæmolytic disease of the newborn rises steadily to almost 0·8 per 1000 live births in 1945–51, a level approaching that expected if simple transfusion alone was being used. A small part of this rise may be due to the greater number of women immunised by transfusion, after blood became more readily available from 1940 onwards.

The first year in which a definite decrease in mortality can be discerned is 1952. Although Diamond first described his method of exchange transfusion in 1947 and this method was used in some hospitals in England from then onwards (Mollison and Cutbush 1948, 1949), many hospitals were still using simple transfusion as late as 1952. In that year the results of a controlled trial, comparing simple and exchange transfusion in many different centres in England, Wales, and Ireland, were published (Mollison and Walker 1952), and this was followed by a more widespread use of exchange transfusion in England. Nevertheless in 1953 the reported mortality from hæmolytic disease of the newborn was 0·6 per 1000 live births—i.e., three times what would be expected if all severely affected infants were being satisfactorily treated by exchange transfusion.

In the face of this it was clearly desirable to study the circumstances of every death certified as due to hæmolytic disease to try to discover why the death-rate remained disappointingly high.

* Aided by a grant for secretarial help from the Scientific Research Committee of the Newcastle Regional Hospital Board.

† This figure is calculated from the data of Armitage and Mollison (1953) applied to the series of Mollison (1956, p. 464, table XXXV). According to these figures the calculated mortality with simple transfusion alone is 17%.

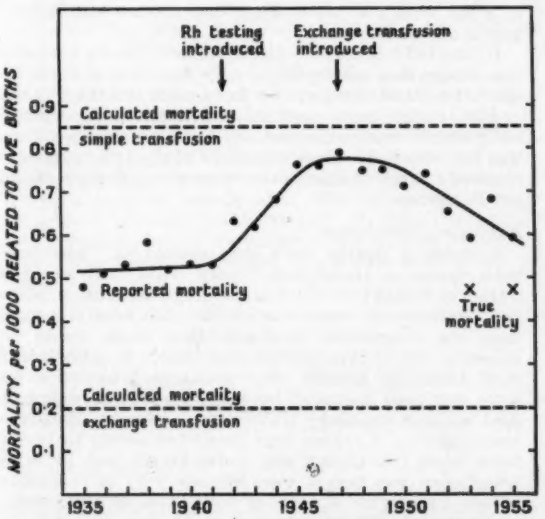

Fig. 1—Mortality from hæmolytic disease of newborn from 1935 to 1955. "Reported mortality" is as reported to Registrar-General. Corrected figures for 1953 and 1955, based on the present investigation, are marked "True mortality".

Method of Inquiry

Copies of the death certificates for all infants certified as dying from hæmolytic disease of the newborn in 1953 and 1955 were made available through the Registrar-General's Office, London.

TABLE I—CAUSES OF DEATH IN INFANTS REGISTERED AS DYING FROM HÆMOLYTIC DISEASE OF THE NEWBORN

—	1953	1955
Due to H.D.N.	312	315
Not due to H.D.N.:		
Kernicterus of prematurity	53	41
Non-hæmolytic hydrops	11 } 97	11 } 85
Miscellaneous	33	33
Not traced	2	0
Total registered as due to H.D.N.	411	400

A circular letter was sent to the doctor who had signed each certificate to explain the purpose of the inquiry; and a form was enclosed asking for the following data:

(1) The sex and birth-weight of the infant.
(2) Its age on admission to hospital (if not born in hospital).
(3) The serological findings in mother and infant, including the result of antenatal tests.
(4) The cord-blood hæmoglobin and bilirubin levels.
(5) The time of onset and degree of jaundice.
(6) Details about any transfusions given.
(7) The clinical course of the disease and mode of death.
(8) The age at death.
(9) The necropsy findings.

In many cases the hospital notes were borrowed and, if necessary, letters were written to the pædiatrician, pathologist, or family doctor, asking for more detailed information.

Data were obtained for 409 of 411 deaths registered in 1953 and for all 400 registered in 1955. (The number of liveborn infants was 684,000 in 1953 and 668,000 in 1955.)

Results

DEATHS NOT DUE TO HÆMOLYTIC DISEASE OF NEWBORN

At an early stage of the inquiry it became clear that many infants were certified as having died from hæmolytic disease of the newborn whereas in fact they had died from other causes (table I).

The commonest "other cause" was kernicterus of prematurity—i.e., kernicterus in a premature infant without any hæmatological or serological evidence of hæmolytic disease of the newborn. This condition was

TABLE II—DEATHS DUE TO HÆMOLYTIC DISEASE OF THE NEWBORN

Cause of death	1953		1955	
Solely H.D.N.:				
Hydrops fœtalis		40		29
Heart-failure	58		55	
Kernicterus	105		82	
Exchange-transfusion	28	239	60	242
Late anæmia	4		1	
Other causes	44		44	
Important contributory factors		33		44
Total		312		315

recognised only after the publications of Aidin et al. (1950) and Zuelzer and Mudgett (1950). Probably its increasing recognition in recent years has masked a slight fall in the number of deaths from hæmolytic disease of the newborn because, up to the end of 1955, deaths from kernicterus, from whatever cause, were recorded as due to hæmolytic disease of the newborn. Similarly, all cases of hydrops fœtalis were recorded as due to hæmolytic disease of the newborn, whereas each year a number occurred where a diagnosis of hæmolytic disease was not supported on pathological grounds or had been excluded serologically. In others—e.g., some infants who had died from hæmorrhagic disease of the newborn—there was no evidence to justify the recorded diagnosis of hæmolytic disease; indeed in many this diagnosis had been excluded by serological tests.

The 182 deaths not due to hæmolytic disease of the newborn will not be considered further here.

CAUSES OF DEATH IN INFANTS WITH HÆMOLYTIC DISEASE

In 87% of the 627 cases in which death was attributed to hæmolytic disease of the newborn, full serological confirmation of the diagnosis was obtained. 69% of the 627 cases were predicted antenatally, 3% were first recognised because of tests on cord blood, and in 15% serological confirmation was obtained postnatally after hæmolytic disease had been diagnosed clinically. In the remaining 13% diagnosis rested mainly on clear-cut clinical and pathological evidence, although in some cases the Coombs test had been found to be positive at some time.

In table II the 627 deaths have been subdivided into those due solely to hæmolytic disease of the newborn and those in which there were other important contributory factors. An attempt was made to answer the question: "Would the child have died if there had been no hæmolytic disease?" If the answer was "Probably not," hæmolytic disease of the newborn was regarded as the sole cause of death. These cases were then further subdivided into the categories shown in table II.

Apart from the cases of hydrops fœtalis, among the deaths due solely to hæmolytic disease of the newborn, heart-failure, kernicterus, and exchange transfusion accounted for 388 of the 481 deaths.

Hydrops Fœtalis

69 deaths were stated to have occurred in hydropic infants born alive; 49 of these were in extremis at birth and died within an hour; 18 more died in the first nine hours; and 2 survived until the second day. None who survived more than an hour were grossly œdematous, but all were very anæmic and should probably have been classified as having very severe hæmolytic disease rather than hydrops. Only 3 were treated by exchange transfusion, and all died during the transfusion.

Heart-failure

In many cases the diagnosis of heart-failure was made by the clinician in charge of the case; in others it was deduced from the recorded observation of severe anæmia leading to death on the first day of life; occasionally it was based on necropsy findings. Some infants who died during exchange transfusion were considered to have died from heart-failure, present before transfusion, and these deaths have been included in the heart-failure group and not among the deaths due to exchange transfusion.

Only 75 of the 113 infants who died from heart-failure were treated by exchange transfusion, and only 66 of these within the first nine hours of life.

Of the 75 in whom exchange transfusion was attempted, 57 died during the transfusion, and in many of these it seemed probable that the immediate cause of death was failure to remove more blood than was injected. In fact, in 30 cases more blood was injected than withdrawn, and in 18 cases equal volumes were exchanged.

The severe nature of hæmolytic disease in this group is shown by the observation that in two-thirds of the cases in which the cord hæmoglobin was recorded it was less than 9 g. per 100 ml. Hæmolytic disease was predicted antenatally in only 88 of the 113 cases in this group, and 22 were recognised because of clinical evidence of very severe disease. 26 of these infants were admitted to hospital only after birth.

Kernicterus

Kernicterus accounted for 105 deaths in 1953 but for only 82 in 1955—a fall possibly associated with an increased use of exchange transfusion. However, this fall was offset by the greater number of deaths during or soon after exchange transfusion in 1955, compared with 1953. In 151 cases, the diagnosis of kernicterus was based on post-mortem findings, but in a few it was deduced from the clinical picture of cerebral damage during the first week of life in a deeply jaundiced infant without other apparent cause.

Of the 187 infants who died from kernicterus, only 60% were born in the hospital where they received treatment. In this group, failure to predict hæmolytic disease or to recognise it soon after birth seems to have been the cause of at least 41 deaths; for, in 31 cases kernicterus was already present when treatment was first considered, and in 10 others the infant was so deeply jaundiced that transfusion was not considered worth while.

Cord-hæmoglobin levels were determined in 77 cases and were above 15 g. per 100 ml. in 30 of these; only 2 of these 30 infants had been treated by early adequate exchange transfusion (defined as more than 50 ml. per lb. body-weight on the first day of life).

Cord-bilirubin levels were determined in only 29 cases; in 3 the level was below 3 mg. per 100 ml. but in 19 it was above 5 mg.

Of the 187 infants who died from kernicterus, exchange transfusion was attempted in only 64; in 9 of these the operation failed completely; in 14 cases less than 40 ml., and in 13 cases between 40 ml. and 60 ml. of blood per lb. body-weight was exchanged; in 4 other cases the volume was not recorded. Thus in only 24 of the 187 cases was a relatively large exchange transfusion (more than 60 ml. per lb.) given.

Exchange Transfusion

In table II deaths have been classed as "associated with exchange transfusion" only when they occurred during or within four hours of exchange transfusion, where the "immediate" cause was not clear but when it seemed, from the information available, that death would not otherwise have taken place at that time. 50 other infants died during or shortly after exchange transfusion but have not been included because they might well have died without exchange transfusion: 36 were already in heart-failure; 3 others were moribund owing to kernicterus when transfusion was undertaken; and 11, when transfusion was begun, were already very ill because of severe hæmolytic disease or some complicating factor such as cerebral hæmorrhage.

The number of deaths ascribed directly to exchange transfusion was 28 in 1953 and 60 in 1955. Among these 88 infants were 37 who were seriously ill at the time of

transfusion (27 of them had cord-hæmoglobin levels below 9 g. per 100 ml.), but this leaves 51 infants whose condition was quite good (7 had cord-hæmoglobin levels above 14·8 g.). Two-thirds of the deaths attributed to exchange transfusion took place before 60 ml. per lb. body-weight had been exchanged, but death was not related to the infant's age at the time of transfusion.

Late Anæmia

In this series only 5 deaths were due to late anæmia—i.e., anæmia recognised for the first time towards the end of the first week of life or later in an infant not seriously ill at birth. All had hæmoglobin values below 5 g. per 100 ml. at the time of admission, and jaundice was never marked in any.

Other Causes

The category "other" in table II refers to cases in which the available evidence suggested that death was due to hæmolytic disease or to the treatment given, but clinical and pathological records were incomplete or otherwise unsatisfactory.

"*Important Contributory Factors*"

Contributory factors were regarded as important when the degree of hæmolytic disease seemed insufficient to account for death. In some instances it was easy to decide that a particular case fell into this category—e.g., when an infant with mild or adequately treated hæmolytic disease had a severe congenital defect. In others it was more difficult—e.g., when an infant with moderately severe hæmolytic disease had a cerebral birth injury. The 77 infants in this group included 11 with severe congenital defects; 18 with cerebral hæmorrhage; 11 with pneumonia, of whom 7 died in the first four days of life and the remainder at periods up to the age of two months; 23 premature infants, of whom 8 weighed less than 3 lb., and 7 weighed 3–4 lb.; 8 whose death was due to maternal causes or associated with delivery; and 6 with miscellaneous conditions.

MANAGEMENT OF HÆMOLYTIC DISEASE OF NEWBORN

Various analyses were made of the way in which the diagnosis was reached and the treatment was given. The 69 cases of liveborn hydrops were excluded because this condition is rarely if ever compatible with survival. On the other hand, cases in which there were thought to be "important contributory causes" of death were included because it was only in one or two isolated instances that the "contributory cause" modified the conduct of the case.

Prediction and Recognition of Hæmolytic Disease

In table III the cases have been subdivided according to the manner in which the diagnosis was first made.

Thus, of the 558 cases, 404 were diagnosed serologically, usually because antibodies had been detected antenatally but occasionally because cord blood taken routinely had given a positive Coombs test. The remaining 154 were diagnosed clinically—149 because of deep jaundice or other evidence of severe disease, and 5 because of anæmia developing towards the end of the first week of life or later.

TABLE III—AGE ON ADMISSION TO HOSPITAL IN RELATION TO METHOD OF DIAGNOSIS

Diagnosis	No. of cases	Born in hospital	Age on admission to hospital			Never admitted
			First 12 hr.	12–24 hr.	After 1 day	
Serological	404(72%)	363	23	6	10	2
Clinical ..	154(28%)	27	29	11	71	16
Total * ..	558	390(70%)	52(9%)	17(3%)	81(15%)	18(3%)

* 69 cases of hydrops in babies born alive are excluded from this analysis.

Of the 404 infants whose disease was diagnosed serologically, 363 were delivered in hospital and 29 were admitted within the first day of life. Only 12 were admitted after the first day or not at all. Of the 154 whose disease was diagnosed on clinical grounds only 67 were born in hospital or admitted within twenty-four hours.

The clinically diagnosed cases can be subdivided into four approximately equal groups depending on the features that led to the recognition of hæmolytic disease: those with signs of severe disease—e.g., anæmia, jaundice, bruising, and œdema—within eight hours of birth; those in which jaundice appeared between eight and twenty-four hours of birth; those in which the diagnosis was made only because of intense jaundice during the first week of life; and those recognised only when signs of brain damage called attention to the diagnosis.

Of the 558 infants under discussion, 289 were jaundiced within eight hours of birth and a further 95 within twenty-four hours. Of the 174 who did not develop jaundice in the first twenty-four hours, 78 died within eight and 35 others within twenty-four hours of birth. Thus only 61 infants (11%) survived more than a day without becoming jaundiced, and even then a quarter of those died from causes other than hæmolytic disease.

In our opinion, 108 deaths could be partly attributed to failure to predict disease and 58 others to failure to recognise clinical evidence early.

Failure to predict hæmolytic disease was very seldom due to the fact that the blood-group factor concerned was not Rh (D). In only 11 cases was disease due to some other incompatibility. 8 were examples of incompatibility within the ABO blood-group system, 2 were due to anti-c, and 1 to anti-E.

TABLE IV—TREATMENT IN RELATION TO METHOD OF DIAGNOSIS

Diagnosis	No. of cases	Exchange transfusion		Simple transfusion		No transfusion
		First day	Later	First day	Later	
Serological	404(72%)	268	7	33	16	80
Clinical	154(28%)	30	16	6	18	84
Total ..	558	298(54%)	23(4%)	39(7%)	34(6%)	164(29%)

Of the cases in which Rh (D) was concerned, only 2% of the failures to predict the disease were due to technical errors. In the rest, failure to predict hæmolytic disease was due to the fact that adequate antenatal tests had not been made. One surprising finding was that, in half the cases diagnosed only on clinical grounds, full serological tests were never carried out, even after delivery; hence the diagnosis was not proved, nor could any reliable prognosis have been given.

It is evident from these various observations that failure to predict the disease was due chiefly to omission of antenatal serological tests rather than to any failure in the tests themselves.

Treatment in Relation to Timely Diagnosis

Table III shows that 390 (70%) of the infants who died were born in hospital, and 52 (9%) were admitted within twelve hours of birth. It is therefore evident that failure to recognise the disease early, although contributory in some cases, was not responsible for the majority of deaths.

In table IV the cases have been divided in the same way as in table III but in relation to treatment.

Of the infants whose disease was diagnosed serologically 66% were treated by exchange transfusion on the first day of life; but 20% received no treatment whatever, although almost all were born in, or admitted to, hospital within twelve hours of birth.

Of those whose disease was diagnosed because of the development of clinical signs of the disease, only 31%

were treated by exchange transfusion and 54% received no treatment.

In 1955, 202 infants had been treated by exchange transfusion, compared with 119 in 1953. Even so, 84 infants who died in 1955 and 153 who died in 1953 had not received exchange transfusion: indeed, in the two years 164 infants had received no treatment at all.

The fact that 321 died despite exchange transfusion calls for separate comment.

Details of Exchange Transfusion

Of the 321 exchange transfusions, 258 were given within the first nine hours and 63 later. Analyses of the amounts of blood exchanged showed no difference between these two groups or between the two years. All the cases have therefore been considered together, and the amounts exchanged are shown in fig. 2.

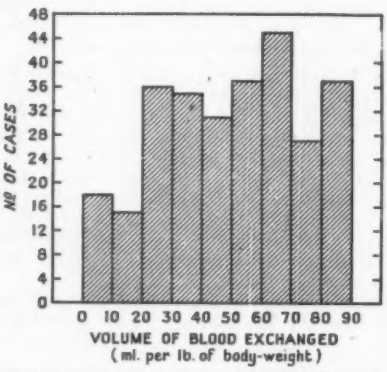

Fig. 2—Volume of blood used in 281 of 321 cases in which exchange transfusion was attempted (volume used in remaining 40 cases was not recorded).

In the cases in which exchange transfusion had been given or attempted only 34% of the babies received more than 60 ml. per lb. body-weight; 21% received 40–60 ml. per lb.; 22% received 20–40 ml. per lb.; and 11% less than 20 ml. per lb. In 12% the precise amount exchanged was not recorded; in half of these the amount was probably trivial.

The amounts of blood injected and withdrawn were about equal in most cases. In 56 infants with cord-hæmoglobin levels below 9 g. per 100 ml. it seems possible that failure to withdraw considerably more blood than was injected contributed to the infant's death. Thus, in 37 of the 56 cases the amount injected was equal to, or greater than, the amount withdrawn; in the remaining cases the amount withdrawn was only slightly (10–20 ml.) greater than the amount injected. Many of these infants died during the transfusion but have been included among the deaths due to heart-failure rather than in those "associated with exchange transfusion."

In a few cases in which there did not seem to be any clear indication for removing more blood than was injected it appeared that this had contributed to the infant's death. Thus in a case where the infant had a cord-hæmoglobin level about 15 g. per 100 ml., 70 ml. more blood was removed than was injected, and this seemed to precipitate collapse and death during transfusion.

The time after birth at which exchange transfusion was performed varied from an hour to six days, but in 80% of cases it was less than nine hours. In 33 cases failure of exchange transfusion was probably due to its being undertaken too late. Among these were 4 very anæmic infants who were treated within the first nine hours of life but whose condition had much deteriorated between birth and transfusion.

The technique of exchange transfusion seemed to have contributed to 28 of the deaths. For example, in 5 the umbilical vein was perforated and a large amount of blood was found free in the peritoneal cavity at necropsy; and in 2 others umbilical thrombophlebitis, associated with a staphylococcal septicæmia and lung abscesses, was found at necropsy. The time taken for exchange transfusion varied from nineteen minutes in one case to nine hours in another, and in 9 cases the rate at which the transfusion was given apparently contributed to death.

Repeated exchange transfusion had been attempted in only 22 infants, all of whom had been born in hospital (6 in 1953 and 16 in 1955).

Tests on Cord Blood

A Coombs test on cord blood was performed in 67% of the cases in 1953 and 78% in 1955; these percentages are very similar to the proportion of cases in which the disease was predicted antenatally in these years. Only 5 false negative results were recorded in the two years.

Cord-hæmoglobin levels were recorded in 50% of the cases in 1953 and 65% in 1955; the plasma-bilirubin level of cord blood was recorded in 14% of cases in 1953 but in 40% in 1955.

40% of all cord-hæmoglobin levels were below 9 g. per 100 ml., 44% were 9·0–14·8 g., and 16% were above 14·8 g.

Influence of Previous Obstetric History on Method of Treatment

Exchange transfusion was used in 70% of cases in which a previous infant in the family had been affected, compared with 54% where no previous infant had had hæmolytic disease. Even so, 24% of infants preceded by affected siblings were allowed to die untreated. There was no obvious relation between the use of exchange transfusion and the number of affected siblings or the severity of disease in these. It was surprising that 8 of the 14 infants preceded by stillbirth due to hæmolytic disease did not receive exchange transfusion; in fact 5 received no treatment at all.

ANALYSIS ON BASIS OF AGE AT DEATH, BIRTH-WEIGHT, AND SEX

Of the 558 infants, 275 died on the first day of life, mostly from heart-failure or during exchange transfusion, and 224 died between the second and fifth days, mainly from kernicterus. 57 died later. In 2 cases the time of death was not recorded.

The birth-weight of 48 was not recorded but 104 (20%) of the remainder weighed 5½ lb. or less. 63 had been born prematurely spontaneously and 41 by premature induction. The birth-weight distribution in the two years was practically identical, and no correlation between birth-weight and cause of death was found except that in some cases prematurity was regarded as an important contributory factor.

In both years there was a preponderance of males among the fatal cases, the ratio being 1·4/1 in 1953 and 1·1/1 in 1955. In table v the cases have been analysed by sex in relation to the main causes of death.

TABLE V—SEX AND CAUSE OF DEATH

Cause of death	Male	Female	Sex not recorded	Ratio
Hydrops fœtalis	32	37	0	0·86
Heart-failure	48	62	3	0·78
Exchange transfusion	41	45	2	0·91
Kernicterus	127	59	1	2·1
Miscellaneous	87	74	9	1·2
Total	335	277	15	1·2

The only difference between the sexes as regards the cause of death is that, among the infants dying with kernicterus, males were twice as common as females—a difference which is statistically significant (cf. Diamond et al. 1950 and Armitage and Mollison 1953). The preponderance of males developing kernicterus was greater in 1953 (75/29) than in 1955 (52/30). A possible explanation is that exchange transfusion was being used less in 1953, and that therefore more deaths from kernicterus took place in that year.

There is a slight preponderance of females in the other groups of cases, but this is not significant.

Discussion

One of the first findings in this inquiry was that many infants dying from other conditions were being registered as having died from hæmolytic disease of the newborn, which disease in fact accounted for only about 75% of the number certified. Most of the deaths wrongly included were due to "kernicterus of prematurity." When this became apparent, the Registrar-General was informed, and he agreed that in future this condition should be certified separately from hæmolytic disease of the newborn.

It is, of course, possible that some infants dying of hæmolytic disease of the newborn were being certified as dying from other causes. The finding that so few infants were recorded as dying from anæmia after the first few days of life suggests that in some cases of this kind hæmolytic disease of the newborn may have been overlooked.

Even when deaths not due to hæmolytic disease are excluded, the deaths are at least three times as numerous as would be expected with modern treatment. There appear to be two main causes for this: (1) failure to predict the disease before birth or to diagnose it sufficiently soon after birth; and (2) failure to attempt an exchange transfusion or to perform it satisfactorily.

If early diagnosis is essential to the correct management of hæmolytic disease, antenatal prediction gives the infant its best chance. This chance was denied to 168 of the 558 non-hydropic infants who died of hæmolytic disease. Failure to predict disease was due to the presence of antibodies other than anti-Rh (D) in only 11 instances and to technical error in only 5. It is therefore clear that failure to predict hæmolytic disease almost always resulted from failure to carry out the necessary tests.

The significance of early clinical features was not always appreciated. Thus 87 infants, although clinically affected within the first twenty-four hours, were not admitted until after this time: indeed 31 were not diagnosed until kernicterus had developed. Early jaundice, present in more than 90% of the fatal cases, often failed to suggest the true diagnosis and the possible need for immediate exchange transfusion.

There is little doubt that exchange transfusion should be given to all severely affected infants, for this is the only method of treatment which will overcome heart-failure in the very anæmic infants and prevent deep jaundice and kernicterus in the others. Since the present inquiry deals only with fatal cases, it can be assumed that most of the infants should have received exchange transfusion; yet 80 of the 404 in whom the diagnosis was made serologically died untreated, and 49 received only simple transfusion. 164 (29%) of the infants who died had not been transfused, and 73 (13%) had received simple transfusion. Simple transfusion was used on the first day of life in 39 cases although only a third as much in 1955 as in 1953; but it is very doubtful whether simple transfusion is ever justified where treatment on the first day is needed. In 52 cases premature labour had been induced in an effort to mitigate the severity of the disease, yet 17 of 45 non-hydropic infants were not treated by exchange transfusion. Similarly, 21 of 74 infants received no treatment even though a previous infant in the family had died from hæmolytic disease of the newborn or had been stillborn from this cause.

321 infants (58%) were treated by exchange transfusion; among the infants admitted after the first day of life the proportion treated by exchange transfusion was lower (23 out of 81). There is little doubt that exchange transfusion should have been given to more of the infants who were deeply jaundiced on admission, for the transfusion can usually be performed by the umbilical route without difficulty up to the age of five or six days. It could similarly be claimed that repeated exchange transfusion was not given as often as was indicated. Of the 187 cases of kernicterus, 124 were not treated by exchange transfusion, and of the 63 where this was attempted, it failed completely in 8, while in 31 the amount of blood exchanged was less than 60 ml. per lb. body-weight.

Although the majority of the cases had been treated by exchange transfusion, the amount of blood exchanged was too small in many cases; for in 121 the operation either failed completely or exchanged less than 40 ml. per lb. body-weight. This, together with the finding that many infants died during the transfusion, suggests that the operation may not always have been carried out as well as it might have been. In a third of the cases the balance between the volume of blood injected and withdrawn was incorrect, for some very anæmic infants received more blood than was withdrawn, and in others the amount withdrawn was no greater than the amount injected. It is possible that citrate toxicity may have played a part in other deaths, but no information on this point was available.

It seems that there is an increasing awareness of the value of estimating the hæmoglobin and bilirubin levels in cord blood: certainly these estimates were made more often in 1955 than in 1953.

The inadvisibility of using the cord-hæmoglobin level as the sole criterion of severity is shown by the observation that 16% of all the cord-hæmoglobin levels were above 14·8 g. per 100 ml.; and that, among the cases of kernicterus, as many as 30 out of 77 (40%) of the recorded levels were over 15 g. Of these 30, only 2 were treated by early adequate exchange transfusion.

The incidence of kernicterus in mature infants with hæmolytic disease of the newborn with a cord-hæmoglobin level above 15·8 g. per 100 ml. is low (5%) without exchange transfusion (Armitage and Mollison 1953). Because of this known relationship, treatment is often withheld from mature infants when the cord-hæmoglobin level is found to be over about 15 g. It has long been clear that, although a high cord-hæmoglobin level is a very favourable prognostic sign, exchange transfusion should still be given if more than a trace of jaundice develops within the first twenty-four hours of life.

Although exchange transfusion is not a difficult operation, the best results are to be expected in hospitals where the staff treat a large number of cases and gain considerable experience. The deaths investigated were distributed among 244 hospitals (172 in 1953 and 165 in 1955). Even if all cases of hæmolytic disease of the newborn were treated in these hospitals alone, the average yearly number in each would have been about 12, of which only about 8 would have needed exchange transfusion. Since it is known that some hospitals have far more than others, it is evident that in some the number of cases of hæmolytic disease treated must be very small indeed.

Summary

The clinical records of all infants certified as dying from hæmolytic disease of the newborn in England and Wales during 1953 and 1955 have been examined.

In each of the two years about 400 infants were certified as dying from hæmolytic disease of the newborn. However, owing to the definition of hæmolytic disease of the newborn for the purpose of certification, the label was often attached to infants dying from other conditions such as "kernicterus of prematurity," and the true number of deaths from hæmolytic disease of the newborn was about 310 in each of the two years.

Factors contributing to the deaths from hæmolytic disease were failure to predict the disease antenatally,

failure to recognise early clinical evidence of the disease, and failure to give adequate exchange transfusion.

Attention is called to the fact that the treatment of hæmolytic disease of the newborn is undertaken at a very large number of hospitals. In many of these the number of cases seen is very small, and it is therefore impossible for the staff to gain the necessary experience and familiarity with this condition.

It is suggested that, if all cases of hæmolytic disease of the newborn (due to anti-Rh (D)) were predicted antenatally and were treated when necessary by early adequate exchange transfusion, the present death-rate could be greatly reduced. Each year, in England and Wales, more than 150 infants would be saved.

We are most grateful to Dr. G. E. Godber, of the Ministry of Health, and to Dr. W. D. P. Logan, of the Registrar-General's department, for making this study possible. We are also greatly indebted to the numerous doctors throughout the country who so readily put their clinical records at our disposal.

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MONGOLISM AND OTHER CONGENITAL ABNORMALITIES

AN EPIDEMIOLOGICAL STUDY IN NORTHAMPTONSHIRE

M. J. PLEYDELL
M.C., M.D. Lond., D.P.H.
DEPUTY COUNTY MEDICAL OFFICER OF HEALTH, NORTHAMPTONSHIRE

THIS investigation was undertaken because I noticed that in Northamptonshire mongol children seemed to be born in groups in different areas at different times. The findings suggest that mongolism and other congenital abnormalities may be more closely related to maternal infection than has hitherto been supposed.

Sources of Information

The information regarding the births of children with congenital abnormalities was obtained as follows:

(1) A search was made of the mental-deficiency records of the mental-health department and the handicapped-pupils register of the school health service department of the local health authority.

(2) With the coöperation of the consultant pædiatricians, a search was made of their records of the congenital abnormalities referred to them.

(3) All the health visitors and midwives of the local health authority were asked about births of children with congenital abnormalities in their areas, and where the mothers were living throughout the pregnancies.

(4) A search was made of the hospital birth registers and the infant-mortality records.

(5) Further information about cases of hare-lip and cleft palate was found in the records of the consultant surgeons serving the area, the school dental department, the hospital consultant dental officer, and the speech therapists of the local health authority.

Where there was more than one abnormality the case was classified under the more serious defect. Thus mongols with congenital heart-disease or cleft palate were classed as mongols. Cases of anencephaly with spina bifida were classed under anencephaly. Cases of spina bifida and hydrocephalus were classed under spina bifida.

TABLE I—BIRTHS OF INFANTS WITH CONGENITAL ABNORMALITIES IN NORTHAMPTONSHIRE, 1944–55

Year	No. of live and still births	No. of cases of					
		Mongolism	Congenital heart-disease	Hare-lip, cleft palate	Anencephaly	Spina bifida	Hydrocephaly
1944	4798	6	16	10	3	10	1
1945	4443	7	10	4	2	7	3
1946	4639	4	10	7	4	8	1
1947	5011	8	18	2	6	10	3
1948	4423	5	13	10	1	5	2
1949	4127	7	17	5	2	5	..
1950	4078	6	15	12	6	6	1
1951	4096	9	11	5	2	7	3
1952	4090	6	12	5	6	16	..
1953	4342	12	11	4	6	5	1
1954	4396	9	13	8	5	8	4
1955	4286	7	10	11	3	11	5
Total	52,729	86	156	83	46	98	24
Incidence per 1000 live and still births		1·63	2·96	1·57	0·87	1·86	0·45

Mongolism

Incidence

84 mongols are known to have been conceived and born alive in the county during the twelve years 1944–55. 2 mongols were stillborn. Each case was confirmed by medical opinion. Doubtful cases with "mongoloid" characteristics, and mongols who were conceived elsewhere but whose mothers moved into the county during pregnancy, were excluded from the survey. No information was available in respect of mongols conceived in the county but born elsewhere.

These data give an incidence of 1 mongol birth in every 613 live and still births (table I). Carter and MacCarthy (1951) found an incidence of 1 in 666. It will be seen from the table that more mongol births were recorded in the second six years of the period under review. Though the incidence may have increased, it is probable that the records during the latter period are more complete and give a more accurate assessment, i.e., 1 mongol birth for every 516 live and still births. (In 1956 9 mongols are known to have been born, out of 4511 live and still births.)

The incidence varied considerably from one year to another. The lowest, in 1946, was 1 mongol birth for every 1160 live and still births; the highest, in 1953, was 1 in 362.

The monthly distribution of mongol births was far from uniform. Thus there is no record of a mongol birth during the eleven months beginning September, 1949, but 5 full-term mongols were born between June 8 and July 3, 1947—i.e., more than 1% of the live births during this period.

Grouping of Mongol Births

When the distribution of mongol births is considered in more detail it appears that about two-thirds of them have occurred in small groups: the remaining third were apparently isolated cases. The following examples of groups are presented for illustration.

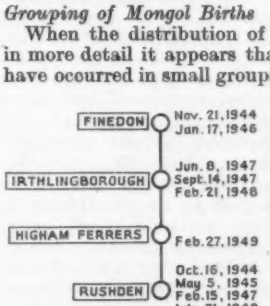

Fig. 1—Mongol births in Rushden area, 1944–49.

Rushden Area

Rushden (population 15,210 in 1946), Higham Ferrers (population 3400), Irthlingborough (population 4700), and Finedon (population 3000) are linked by the road A6. In 1944–49, 10 mongols were born in this area (fig. 1).

In the two years 1947–48 when there were 13 mongol births in the county, no fewer than 5 of these were in Rushden, Higham Ferrers, and Irthlingborough, whose populations and births are less than a tenth of those of the county. A mongol and an imbecile with some mongolian stigmata were born on the same day in Higham Ferrers and Irthlingborough, which are two miles apart.

In Irthlingborough only 3 mongols are known to have been born in the twelve years, but these 3 were born within a period of nine months. 85 babies were born in Irthlingborough in 1947; so about 1 in every 21 babies born at this time was a mongol. Also in 1945–47 there were born in this area 4 imbeciles for whose condition no cause could be found. Their dates of birth were, in Rushden, Jan. 27, 1945, and May 18, 1946; in Higham Ferrers, June 1 and June 8, 1947.

Fig. 2—Mongol births in Rushden area, 1950–55.

In 1950–55 only 3 mongol births were recorded in the same area, and all 3 births occurred within thirteen months (fig. 2).

Oundle Area

In August, 1945, a mongol was born in Glapthorne (fig. 3), where about 5 babies are born each year. In December, 1946, a mongol was born in the hamlet of Stoke Doyle where about 2 babies are born annually. On June 20, 1947, a full-term mongol was born at a farmhouse near Cotterstock. The next day another full-term mongol was born at Southwick. Finally, a week later, a full-term mongol was born at Weldon. In the nine years since then only 1 mongol has been born in this area.

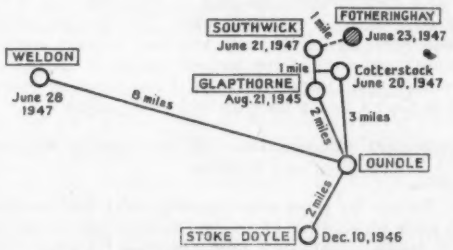

Fig. 3—Mongol and imbecile births in Oundle area.

Only 2–3 babies are born each year in the neighbouring hamlets of Cotterstock and Southwick. It seems a remarkable coincidence that, over a period of twelve years, 2 mongols were born on successive days in these two hamlets. In Weldon, on a proportionate basis, 32 babies would have been born in 1947, and again it seems remarkable that the only mongol born in this village over the past twelve years was born a week after the 2 at Cotterstock and Southwick.

It is worth noting that on June 23, 1947, an imbecile, for whose condition no cause could be ascertained, was born at full term to a mother aged 26 about a mile from Southwick in the hamlet of Fotheringhay, where 3–4 babies are born each year.

Wellingborough Area

9 mongols are known to have been born in the county in 1951. Of these, 5 were born in or near Wellingborough, 3 of them within seven weeks (fig. 4).

On March 18 a mongol was stillborn at Wilby (population 523 in 1951; about 8 births a year). On May 20, a mongol was born at Holcot (population 350; about 5 births a year). On August 6, a mongol was born in Great Doddington (population 671; about 10 births a year). Three weeks later, a mongol was born at Little Harrowden, a village of about the same size. A month later a 5th mongol was born in Wellingborough itself.

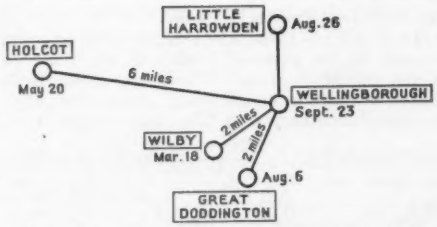

Fig. 4—Mongol births in Wellingborough area in 1951.

Daventry Rural District

5 of the 9 mongol births in 1951 have just been described. 2 other mongols were born in Daventry rural district about three miles apart and within three weeks of each other.

One birth was at Watford (population 281; about 4 births a year), and the other in a group of houses at Buckby Wharf, three miles away.

An 8th mongol was born in Kettering, and the 9th at Woodford.

Corby Area

In the eight years 1944–51 there is no record of a mongol birth in this rapidly growing industrial town. In 1952, however, 4 of the 6 mongol births recorded in the county took place in or near Corby (fig. 5).

In February a mongol was born in Corby itself (population 18,050, with 449 births in 1952). Two months later a mongol was born in Great Oakley (population 272, with about 5 births a year). In November a full-term mongol was stillborn at Brigstock. Seven weeks later another full-term mongol was born in the same village (population 1098, with about 17 births a year). The only 2 mongol births recorded in Brigstock during the twelve years 1944–55 were within seven weeks of each other. In July, 1953, a second mongol was born in Corby.

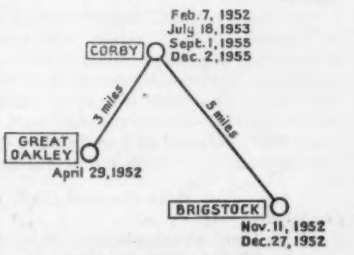

Fig. 5—Mongol births in Corby area.

In 1955 7 mongols are known to have been born in the county: 2 were born in Corby within three months of each other.

Urban and Rural Areas

The incidence of mongol births during the twelve years was not greater in towns than in the countryside, but the grouping is seen chiefly in the rural areas, where epidemiological patterns are always more distinct.

Congenital Disease of the Heart

Incidence

From the sources already set out, the incidence of congenital heart-disease was assessed (table 1). Of the 156 cases ascertained, 81 were obtained from the consultant pædiatricians, 5 from the school medical officers, and 70 from death certificates.

The latter source is open to the criticism that, where necropsy was not performed, some cases of asphyxia livida and asphyxia pallida may have been diagnosed as congenital disease of the heart. Nevertheless it is worth recording that the information thus obtained indicates the incidence of heart defect to vary from 1 per 243 live and still births in 1949, to 1 per 464 in 1946, the incidence over the twelve years under review being 1 per 338 live and still births (0·29%). This compares with an incidence of 0·24% in the obstetric units of University College Hospital and Queen Charlotte's Hospital, 1947–51 (Penrose 1955).

Geographical Distribution of Births

In 145 of the 156 cases, the early months of pregnancy were spent at the place of birth; in the remaining 11 there was no information. There was no unusual concentration of cases in urban areas. As in mongolism, the geographical distribution of the births suggests in some

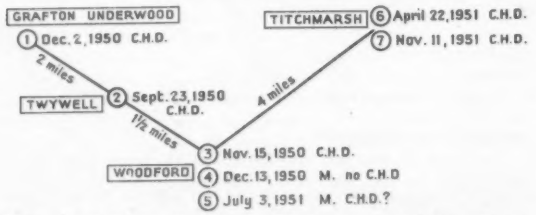

Fig. 6—Births in Woodford area. C.H.D. = congenital heart-disease, M. = mongol.

places an infectious process. Thus, of the 26 patients known to have been born in 1950–51, 5 were born in the Woodford area (fig. 6). No others were born in these villages during the twelve years under review. There was no known relationship between these cases.

In 1951 (Census 1954) the populations (and annual births) were: Grafton Underwood, 340 (about 5); Twywell, 339 (about 5); Woodford, 1435 (about 22); Titchmarsh, 538 (about 8).

Association Between Mongolism and Congenital Heart-disease

The geographical distribution of births of babies with mongolism and of babies with congenital heart-disease sometimes suggests a common ætiological factor, since on occasions both conditions arise in the same area at about the same time (figs. 6 and 8). Moreover, the incidence of congenital disease of the heart is high in mongols; and the pedigree of one family suggests a hereditary predisposition to both abnormalities in the same family.

Hare-lip and Cleft Palate

Incidence

With these abnormalities, the incidence can be assessed with perhaps greater accuracy, for the diagnosis is obvious. In the present survey, the cases ascertained give an incidence of 1 in 635 live and still births (table I) which is comparable with previous assessments cited in the literature. The highest incidence was in 1950 (1 in 340 live and still births), and the lowest in 1947 (1 in 2506). Thus it varied considerably from year to year. There was no unusual concentration of cases in urban areas.

Geographical Distribution of Births

In 73 out of 83 cases it was possible to ascertain that the mother had lived in the area from the time of conception throughout her pregnancy. The distribution of the births at times suggests an infectious process (fig. 7), though this tendency seems less than with the other abnormalities. There was no known relationship between any of the families affected in the Woodford Halse and Brackley areas.

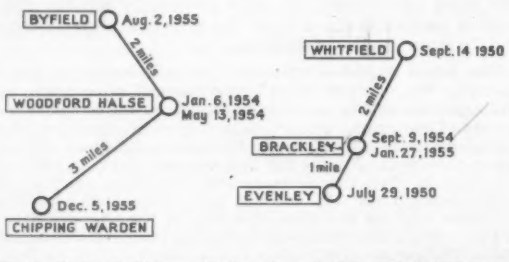

Fig. 7—Births of children with hare-lip and cleft palate in two areas.

In 1951 (Census 1954) the populations (and annual births) were: Byfield, 796 (about 12); Woodford Halse, 1764 (about 27); Chipping Warden, 701 (about 11); Whitfield, 133 (about 2); Brackley, 2531 (about 38); Evenley, 382 (about 6).

No other cases of hare-lip and cleft palate are known to have been conceived and born in these villages in 1944–55. In Brackley the years of births of infants with hare-lip and cleft palate are the same as the years of births of mongols (figs. 7 and 8).

Although this survey is restricted to 1944–55, it is worth recording that in Corby in 1955 and 1956, 8 babies

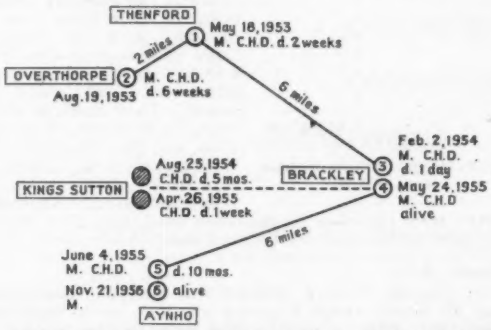

Fig. 8—Births in Brackley area of infants with mongolism (M.), congenital heart-disease (C.H.D.), or both, showing age at death. d = died.

were born with hare-lip and cleft palate (i.e., 1 per 170 live and still births), whereas in 1944–54 only 6 cases were ascertained (i.e., 1 per 689). The months of birth in 1955 were May, July, and August; in 1956 4 of the 5 patients were born in the last six weeks of the year. In November and December, 1956, 1 baby out of every 30 born in Corby had a hare-lip and cleft palate.

Congenital Abnormalities of the Central Nervous System

Incidence

My figures for these abnormalities may well be incomplete since an analysis of all the causes of stillbirths could not be made. It appears, however, that the geographical incidence varies considerably, and that anencephaly and spina bifida are subject to secular changes (Record and McKeown 1949). The incidence of central-nervous-system abnormalities (0·32%), compares with an incidence of 0·36% in University College Hospital and Queen Charlotte's Hospital, 1947–51 (Penrose 1955).

Geographical Distribution of Births

Only 46 anencephalic births were recorded, and it would be unwise to draw conclusions from so small a number. Nevertheless it is worth reporting that the cases seem to be related to the density of population. Thus the incidence in the urban areas is about double that in the rural areas; the incidence in the industrial belt is three times that in the rest of the county. Most cases in rural areas arise not far distant from towns. A similar distribution of hydrocephalic births is noted also, though the numbers are even more limited: the urban incidence is nearly three times the rural incidence. In contrast to the distribution of anencephalic and hydrocephalic births, there is no concentration in urban areas of babies born with spina bifida.

When the anencephalic births are considered in more detail they are seen to occur in groups, as noted by P. Del-Vesco as long ago as 1859. This grouping is less evident in cases of spina bifida and hydrocephalus, though in places the abnormalities seem to be associated.

In 1954 there were 5 anencephalic births recorded in the county: all of them were in Kettering—an incidence of about 1% of the live and still births in that borough.

The dates of these births were April 16, May 16, Sept. 3, Sept. 5, Dec. 25. Of the other years in the period 1944–55, there were 2 anencephalic births in 1944, 2 in 1947, 1 in 1952, and none in any other year.

Loddington (population 315, with about 5 births a year).—The only congenital abnormalities recorded in this village over the past thirteen years are 2 cases of anencephaly. The infants were born in April and September, 1950; there was no known relationship between the families. (In 1950 6 cases of anencephaly were recorded in the county.)

Boxeat (population 1088, with about 17 births a year).—The only congenital abnormalities recorded are 1 case of spina bifida and 1 of anencephaly. Both were born at full term on the same day—Feb. 23, 1947. There is no known relationship between the families. (In 1947 6 cases of anencephaly and 10 of spina bifida were recorded in the county.)

Cransley (population 314, with 10 births in 1952 and 1953).—Only 2 cases of congenital abnormality are recorded in this village, but a mother who lived there until three weeks before her confinement gave birth to a baby with hare-lip and cleft palate. There is no known relationship between the families. The dates of birth were May 14, 1952 (anencephaly), June 29, 1952 (hare-lip and cleft palate), and Sept. 24, 1953 (anencephaly). Thus 3 of the 11 mothers living in Cransley during their pregnancies in 1952 and 1953 gave birth to abnormal babies. (In both 1952 and 1953 6 cases of anencephaly were recorded in the county.)

Wootton (population 1115, with about 18 births a year).—The only recorded cases of congenital abnormalities of the central nervous system in this parish are: anencephaly on March 6, 1953 (this mother moved in at the seventh to eighth week of pregnancy); of spina bifida and hydrocephalus on Nov. 14, 1953; and of spina bifida and hydrocephalus on Feb. 3, 1954. (In 1953 6 cases of anencephaly and 5 of spina bifida were recorded in the county. In 1954 8 cases of spina bifida were recorded.)

Orthopædic Congenital Abnormalities

A complete survey was not undertaken of the incidence and distribution of talipes and congenital dislocation of the hip. The data obtained, however, in the present inquiry suggest an unusual distribution of births in these abnormalities also.

Association of Abnormal Births with Infections

The events recorded here could be due to chance; but on the face of it they suggest that some environmental factor induces congenital abnormalities—a factor which does not remain constant in any locality but is subject to variation. This environmental factor might be infection.

From a study of the epidemiological patterns of the notifiable infectious diseases in 1944–55, it seems that the distribution of mongol births has a closer association with scarlet fever than with any other infection. Most of the virus infections, however, are not notifiable, and the only epidemiological records relating to them are those provided in reports from head teachers of local-authority schools, who are asked to notify all such illnesses. These records are available only since 1951 and, though of very limited value, they too suggest that mongol births are more closely associated with scarlet fever than with other infectious diseases. In the first six-year period both conditions were commoner in the north of the county than in the south, whereas in the second six years both were commoner in the south.

Seasonal Incidence

The seasonal incidence of births of babies with congenital heart-disease has been described by Polani and Campbell (1954–55). McKeown and Record (1951) noted a seasonal variation of anencephalic births. My survey does not show any unusual seasonal distribution of conceptions or births of babies with hare-lip and cleft palate. Classification of mongol births in individual months of the year is unsatisfactory since a considerable proportion are born prematurely: thus of the present series of 86 mongol births, judging by the information given by the mothers and by the records, 24 were premature, while 6 were overdue. From these data the *expected* dates of confinement were calculated and compared with the incidence of live births both in Northamptonshire and in England and Wales.

TABLE II—MONGOL DEVELOPMENT RELATED TO INCIDENCE OF SCARLET FEVER

—	Quarter			
	1st	2nd	3rd	4th
No. of mongol babies conceived (Northamptonshire, 1944–55) ..	22 (26%)	14 (16%)	23 (27%)	27 (31%)
No. of mongols 1 month after conception ..	22 (26%)	18 (21%)	16 (19%)	30 (35%)
No. of mongols 2 months after conception	31 (36%)	18 (21%)	14 (16%)	23 (27%)
No. of cases of scarlet fever (Northamptonshire, 1944–55) ..	384 (28%)	275 (20%)	271 (19%)	461 (33%)

Although the monthly figures of expected mongol confinements are small and subject to wide variation, it is noteworthy that the maximum incidence (approximately 40% of the total) was in the three months August, September, and October, when the national and county incidence of live and still births is steadily falling.

The ætiological factor responsible for mongolism is thought to operate within two months of conception. From the available data we can calculate the monthly and quarterly incidence of conceptions of mongol babies in Northamptonshire during the years under review. Unfortunately there is no information about the monthly incidence of notifiable diseases, but the figures for each quarter during the same period are known (returns to Registrar-General 1947–55). To compare the two sets of data, therefore, the conceptions were estimated on a quarterly basis. A comparison of the quarterly incidence of conceptions of mongols with that of notifiable infections shows a closer association with scarlet fever than with the other infections (table II).

Infant Mortality in Mongols

Of the 84 mongols born alive in 1944–55, 21 died in the first year of life—an infant-mortality rate of about 25%. It may be that the present survey is incomplete, particularly in the earlier years, in respect of mongols who died or moved out of the county in the first few months of life, and that the true incidence of mongol births and infant deaths is higher than the figures quoted. Nevertheless it is worth noting that in the first nine years of the survey (1944–52), 58 mongols were born, of whom 10 died in infancy including 1 in the neonatal period; whereas in the two years 1953 and 1954, 21 mongols were born, with 9 infant deaths including 4 neonatal deaths. In the last year, 1955, 2 of the 7 mongols born died in infancy.

If mongol births were not associated with an infectious process, one would expect an even distribution of such births in time and space and a progressive decrease in the number of infant deaths among mongols because of medical advances and economic improvement. If, however, mongol births were associated with an infectious process, one would expect variations in the incidence of the births, and fluctuations in the infant-mortality rate in relation to the severity of the infection. The incidence and distribution of mongol births and deaths in Northamptonshire support the hypothesis of infection.

The distribution of mongol deaths in the Brackley area deserves special mention (fig. 8). Of the 5 mongols born in this area in 1944–55, the 1st (born in May, 1953, in

Thenford) died after two weeks, from peripheral gangrene and coarctation of the aorta. The 2nd, born three months later only two miles away, died after six weeks from heart-failure due to congenital heart-disease. The 3rd, born in Brackley in February, 1954, died after one day and was found to have a patent interventricular septum. The 4th, born in May, 1955, in Brackley, was the only one to survive, and she is also thought to have a patent interventricular septum. The 5th, born two weeks after the 4th in Aynho, died after ten months from heart-failure due to a patent interventricular septum. The causes of death were verified at necropsy in all cases. It is also worth noting that 2 babies with congenital heart-disease who were not mongols were born in this area (at King's Sutton) in 1954–55. Both died, one after five months, the other after one week: in both cases the diagnosis was confirmed by autopsy.

In the present survey, records indicated that 14 out of 38 mongols appeared to have a heart defect—an incidence of more than 1 in 3. In the Brackley area however, all 5 mongols had cardiac defects—in 3 of such severity that they died in a few weeks; the 4th died within a year, and the 5th has a severe cardiac defect. (Clinical examination indicates that a mongol born in November, 1956, in this area has no heart defect.) It can be argued that such a concentration of gross heart defects in mongols in one area in a short period can occur by chance; but it is more easily explained by an infection, which was presumably of greater severity than elsewhere, since in no other part of the county is there a similar picture during the years under review. For example, no cardiac defect has been detected in the 6 mongols born in the Oundle area, 5 of whom are known to be alive (the sixth has moved out of the county).

Streptococcal Infections in Pregnancy

If mongolism is associated with a streptococcal infection in pregnancy, either one would expect a history of illness in the mother, or one must postulate that the mode of streptococcal infection is so selective that the fœtus is attacked without any maternal constitutional disturbance.

Attempts to associate a history of maternal illness in pregnancy with the subsequent birth of a mongol have not been convincing. In the present survey, of 35 mothers questioned, 12 gave a history suggestive of streptococcal infection in early pregnancy, but similar findings might well be obtained from a control group.

Lundstrom (1952) showed that the incidence of congenital heart-disease was significantly higher in infants whose mothers had been exposed to rubella in the first four months of pregnancy, even when the mothers had previously suffered from rubella and gave no history of illness in pregnancy. Evidently, the fœtus is highly vulnerable during early pregnancy and can be attacked by an infectious organism when there is no sign of ill-health in the mother. There is reason to think that this may also happen with transplacental spread of streptococcal infections (De Lee 1916, Curtis 1916, Rosenow 1920, Nickel and Mussey 1927). The affinity of streptococcal toxin for rapidly dividing cells is well known.

Factors Known to be Related to Mongolism

Maternal age.—The fact that the incidence of mongolism is associated with maternal age does not exclude an infectious process. Acute rheumatism, and subacute bacterial endocarditis (Hobson and Juel-Jensen 1956), both of which are thought to be associated with streptococcal infections, have a higher incidence in certain age-groups. A mother who is beginning or approaching the end of her childbearing period may be more subject to viral or bacterial attack than a young healthy woman. Moreover, dental sepsis is probably more common among mothers in the older age-groups.

Familial incidence.—The familial diathesis or predisposition of certain mothers to give birth to mongols or to babies with other abnormalities is compatible with an infectious process (cf. acute rheumatism). Turpin and Lejeune (1953) have reported the case of a girl who had acute rheumatism in adolescence and later gave birth to 5 mongols.

Social class.—The incidence of mongol births in the present survey appears to be higher among poorer persons. The incidence of infections is known to be higher among the poorer classes.

Discussion

Although it has been established that rubella plays an important part in the ætiology of congenital abnormalities, attempts to associate congenital abnormalities with other infections have been disappointing. The survey by Lundstrom (1952), however, indicated that the degree of immunity which will protect an expectant mother from overt illness is not necessarily sufficient to protect the fœtus. The epidemiological evidence in the present survey suggests that some abnormalities are the result of an infectious process: indeed sometimes its path can almost be traced in retrospect, through the community.

A survey of this kind can produce circumstantial evidence of the causal rôle of infections where clinical inquiry fails to elicit a history of illness or contact with illness. I cannot claim statistical significance for my data; but this is hardly surprising when one considers that not only can one infection, rubella, produce a number of different abnormalities, but also that one abnormality can probably be produced by a number of different factors. In addition, sex, heredity, and the critical time of attack are known to play their parts in determining the nature of the abnormality: their effects overlap the effects of infection, and the picture will often be confused and destroyed. Nevertheless it seems desirable that inquiries and surveys in other areas should be made.

It would be unwise on epidemiological evidence alone to try to establish which infection or infections are responsible for individual abnormalities. In the past attention has been concentrated on the virus infections, but there appears to be no reason to exclude bacterial agents. Congenital toxoplasmosis and congenital syphilis indicate that the placenta is no barrier to organisms; and some of them may act on the fœtus through exotoxins rather than by direct bacterial attack. The selective and toxic action of certain strains of streptococci on the fœtus, and the rôle of these bacteria in producing congenital abnormalities, may be greater than has been supposed.

The importance of establishing the association between infections and congenital abnormalities lies in the possibility of prevention. At present public-health measures can be taken to try to prevent expectant mothers from coming into contact with rubella. Moreover, mothers who are exposed to rubella in early pregnancy can be partially protected with gamma-globulin. If the Northamptonshire findings were corroborated, these preventive measures might have to be extended to expectant mothers exposed to other infections, to mothers in the vulnerable age-groups, and to mothers who seem to have a hereditary predisposition to congenital abnormalities. Immunisation or chemotherapy as soon as pregnancy is diagnosed might tide both mother and fœtus over the early months of gestation. Perhaps in the future the protection of the individual against infection will start before or soon after conception rather than shortly after birth.

Summary

A survey has been made in Northamptonshire to ascertain the incidence and distribution of births of mongols and babies with certain other congenital abnormalities during the twelve years 1944–55.

Many of these births were geographically aggregated in a way that suggests that they resulted from infection.

The known facts relating to mongolism and some other congenital abnormalities are compatible with an infectious ætiological factor. In the present survey the seasonal incidence of mongol births, the severity of defect, and the distribution of deaths of mongol infants suggest that this abnormality is associated with infection of the mother—possibly streptococcal.

If the Northamptonshire findings are corroborated, the public-health measures which are now undertaken to try to prevent fœtal abnormalities resulting from rubella infections might usefully be extended to protect the mother and fœtus from other infections.

I should like to express my thanks to Dr. C. M. Smith, county medical officer of health, Northamptonshire, for his encouragement in undertaking this survey; to Prof. L. S. Penrose for his advice; and to the consultant pædiatricians, surgeons, and obstetricians who let me see their records. It also gives me pleasure to express my debt to the doctors who provided me with information in many cases, to the health visitors and district-nurse midwives for their conscientious inquiries on my behalf, and to the staff of the health department and the hospitals for the help they gave me.

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TRICUSPID STENOSIS

J. F. PANTRIDGE
M.C., M.D. Belf., M.R.C.P.
PHYSICIAN

R. J. MARSHALL
M.D. Belf., M.R.C.P.
PRINCIPAL REGISTRAR

ROYAL VICTORIA HOSPITAL, BELFAST

TRICUSPID stenosis is not infrequently found at necropsy in cases of rheumatic heart-disease (Cooke and White 1941). It is almost always associated with mitral stenosis and often also with aortic-valve lesions. The presence of mitral stenosis tends to mask some of the signs and symptoms of the tricuspid-valve lesions; and the diagnosis may thus be overlooked. Bailey and Bolton (1956) explored the tricuspid valve at mitral valvotomy in 98 patients and found significant stenosis in 15; in only 3 of these had the diagnosis been established before operation.

Until lately the diagnosis of tricuspid stenosis was of only academic interest. Since 1953, however, occasional reports of tricuspid valvotomy have been published. Hollman (1956) found details of 18 published cases and added another. More recently 4 cases have been reported by Yu et al. (1956) and 3 by Dogliotti et al. (1956). It is clear that in suitably selected cases the operation is rewarding. Tight tricuspid stenosis is extremely disabling, and we must hope that increasing awareness of its existence and its importance will lead to more cases being submitted for surgical correction.

Of 400 patients selected for mitral valvotomy in the Royal Victoria Hospital, Belfast, 2 have also had tricuspid valvotomy; a 3rd patient has moderately severe tricuspid stenosis, but operation is not yet indicated. In this paper we report these 3 cases and discuss the clinical, hæmodynamic, and surgical aspects of the condition.

Case-reports

FIRST CASE

A girl, aged 19, was first seen in October, 1953, complaining of moderate dyspnœa on exertion and palpitation for the previous year. She had no orthopnœa or hæmoptysis. The jugular venous pressure was raised and there were prominent *a* waves. The first sound in the mitral area was slapping in quality; a rumbling diastolic murmur with presystolic accentuation was maximal in the fourth left intercostal space just to the left of the sternum, and there was a blowing early diastolic murmur at Erb's point. No murmurs were audible in the aortic area. Fluoroscopy showed slight enlargement of the right atrium; there was no increase in pulmonary vascular markings. Electrocardiography showed peaked P waves 2–4 mm. high in the standard and precordial leads. The diagnosis was mitral and tricuspid stenosis.

Investigations

Cardiac catheterisation on Nov. 17, 1954, showed the following pressures:

Site	*Mean pressure (mm. Hg)*
Right "pulmonary capillary"	1
Main pulmonary artery (rest)	5
Main pulmonary artery (exercise)	9
Right atrium	4½

The mean pressure in the right atrium equalled that in the pulmonary artery; in the absence of pulmonary stenosis this could be explained only by gross obstruction at the tricuspid valve.

A year later (October, 1955) her condition had further deteriorated; she had dyspnœa and anginal pain after walking for a few yards and had frequent palpitation but no orthopnœa or hæmoptysis. She felt weak and tired, and menstrual function had ceased. The physical signs were unchanged. Fluoroscopy showed considerable enlargement of the right atrium; the electrocardiogram (fig. 1) was unchanged. Femoral arterial blood was slightly desaturated (92%), and the hæmoglobin was 17·5 g. per 100 ml.

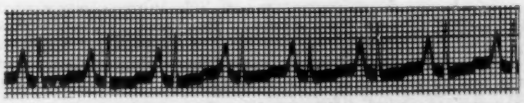

Fig. 1—Electrocardiogram (case 1) showing tall peaked P waves in lead II.

At cardiac catheterisation the right atrium was found to be grossly enlarged; the catheter repeatedly coiled up, and great difficulty was experienced in passing it through the tricuspid valve. Pressures taken with a capacitance manometer and recorded on an Elmqvist four-channel recorder (fig. 2) provided conclusive evidence of tight tricuspid stenosis; right atrium 17/8 mm. Hg (mean 10 mm. Hg); right ventricle 15/0 mm. Hg (mean 5 mm. Hg).

Tricuspid Valvotomy

Mr. T. B. Smiley operated on Feb. 7, 1956, using a transverse sternum-splitting approach. The left atrium was entered through its auricle, and the mitral valve was found to be tightly stenosed, just admitting a finger-tip. A satisfactory valvotomy was achieved with the knife. The right atrium was seen to be enormously enlarged and it too was entered through its auricle. An extreme degree of tricuspid stenosis was found; the orifice was only a few millimetres in diameter. A very satisfactory split was obtained with the finger. No incompetence was noted at either valve before or after operation.

Progress

On return to the ward the patient was deeply cyanosed and cold; her peripheral pulses were impalpable, her blood-pressure was unrecordable, and her respirations were rapid and shallow. Her pulse was irregular, with periods of asystole lasting up

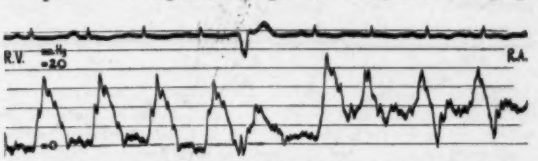

Fig. 2—Record during catheter withdrawal through the tricuspid valve (case 1) indicating tricuspid stenosis and diastolic gradient 10 mm. Hg.

to five seconds. Attempts to restore the blood-pressure by intravenous infusion of blood and of *l*-noradrenaline were unsuccessful.

Two days later she remained drowsy and cyanosed, with respirations rapid and shallow, pulse rapid though regular, blood-pressure still unobtainable. Triple rhythm was present. Further attempts to restore the blood-pressure with *l*-noradrenaline and hydrocortisone failed. On Feb. 11, four days after operation, she became conscious for the first time, with respirations improved, and systolic blood-pressure 90 mm. Hg. There was slight icterus, and the blood-urea level was 136 mg. per 100 ml. During the next week she rapidly improved, although the jaundice temporarily deepened. The serum-bilirubin reached a peak of 5·9 mg. per 100 ml., but other liver-function tests gave normal results. The patient was fully ambulant on Feb. 18, and was discharged home six days later with no evidence of hepatic or renal damage.

Seen again in July, 1956, she was fit for all housework, walked several miles daily, and wanted to resume factory work. Her jugular venous pressure was normal. The mitral diastolic murmur was faint and no murmur was audible in the tricuspid area, but there were systolic and diastolic aortic murmurs. The blood-pressure was 115/80 mm. Hg.

SECOND CASE

A housewife, aged 35, had uneventful pregnancies in 1946 and 1949. In 1954 she first noted moderate dyspnœa on hills and stairs. Two years later she again became pregnant; the exertional dyspnœa steadily increased, and she had attacks of paroxysmal dyspnœa and orthopnœa.

When she was admitted on Aug. 15, 1956, the cardiac rhythm was regular, the mitral first sound was accentuated, there was a mitral diastolic murmur, and an early diastolic murmur was audible at Erb's point. The uterus corresponded in size to a 28-week pregnancy. Fluoroscopy showed gross pulmonary congestion, considerable enlargement of the right ventricle and the left atrium, and moderate prominence of the pulmonary trunk. Electrocardiography showed evidence of right ventricular hypertrophy.

Mitral Valvotomy

She was treated for a fortnight with complete rest in bed, a strictly salt-free diet and mersalyl. Since little improvement resulted from these measures, mitral valvotomy was performed on Aug. 31, by Mr. J. A. W. Bingham. The lateral commissure was satisfactorily split, and convalescence was uneventful apart from the onset of atrial fibrillation, which was controlled with digitalis.

Six weeks after operation the patient was readmitted to hospital and was delivered of a child which was premature but survived. During the puerperium the jugular venous pressure was high, the liver edge was palpable 15 cm. below the costal margin, and the liver exhibited expansile pulsation. A diastolic murmur was heard in the mitral and tricuspid areas and a systolic murmur at the lower end of the sternum.

Cardiac catheterisation showed the following pressures:

Site	Mean pressure (mm. Hg)
Right "pulmonary capillary"	20
Main pulmonary artery	24
Right ventricle	14
Right atrium	14

An end-diastolic pressure-gradient was demonstrated across the tricuspid valve indicating the presence of tricuspid stenosis, and in addition a rise in intra-atrial pressure at the time of ventricular systole indicated tricuspid incompetence (fig. 3).

Tricuspid Valvotomy

At operation (Mr. Bingham) on Nov. 19, access to the tricuspid valve was through the wall of the right atrium. Moderate stenosis with some incompetence was found. The valve was split with the finger so as to make the orifice two or three times as large. The amount of incompetence was unaffected.

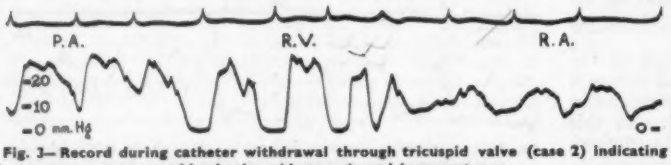

Fig. 3—Record during catheter withdrawal through tricuspid valve (case 2) indicating combined tricuspid stenosis and incompetence.

Convalescence was uneventful, and at the time of discharge the liver was smaller. At review on May 15, 1957, improvement was maintained.

THIRD CASE

A woman, aged 27, noted increasing dyspnœa on exertion since a pregnancy in 1949. When first seen in April, 1956, she was very breathless on hills and stairs and unfit for full housework.

Her jugular venous pressure was slightly raised, and large *a* waves were seen. A slapping first sound and a rumbling diastolic murmur in the mitral area were heard, and an opening snap was audible over the entire precordium. The cardiac rhythm was regular. Fluoroscopy showed slight increase in vascular markings, considerable enlargement of the right ventricle, and moderate enlargement of both atria. Tall peaked P waves were present in the electrocardiogram; there was no evidence of right ventricular hypertrophy. Cardiac catheterisation showed the following pressures:

Site	Pressure (mm. Hg)
Pulmonary "capillary" (resting)	(20)
Pulmonary "capillary" (after exercise)	(35)
Pulmonary artery	60/30 (40)
Right ventricle	60/0 (20)
Right atrium	10/5 (6)

(Mean pressures in parentheses.)

The degree of pulmonary hypertension was consistent with severe mitral stenosis. An end-diastolic pressure-gradient of 5 mm. Hg across the tricuspid valve indicated tricuspid stenosis.

Mitral Valvotomy

The mitral orifice was only a few millimetres in diameter. A satisfactory split was achieved.

Nine months after operation the jugular venous pressure was still raised and large *a* waves were seen. A diastolic murmur in the mitral area was less conspicuous, but a diastolic murmur was easily audible over the lower end of the sternum; the opening snap was maximal in intensity in the tricuspid area. Repeat cardiac catheterisation showed that the right ventricular systolic pressure was normal and the right atrial pressure was unaltered from that recorded before mitral valvotomy:

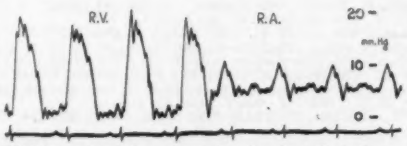

Fig. 4—Withdrawal tracing (case 3) showing diastolic gradient of 5 mm. Hg and large *a* waves on atrial tracing.

Site	Pressure (mm. Hg)
Right ventricle	17/0 (7)
Right atrium	10/5 (6)

(Mean pressures in parentheses.)

Prominent *a* waves were still seen in the atrial pressure tracing, and the end-diastolic pressure gradient was unaltered at 5 mm. Hg (fig. 4).

In view of the absence of symptoms tricuspid valvotomy has been postponed; it may well be required in the near future.

Discussion

Symptoms and Signs

Thompson and Levine (1937) have pointed out that tricuspid stenosis resembles constrictive pericarditis in that cardiac filling is seriously impaired. There is consequently a raised venous pressure and diminution of cardiac output, the latter causing fatigue and effort intolerance. When, as in case 1, the tricuspid stenosis is critically tight, symptoms from the associated mitral lesion—e.g., orthopnœa and hæmoptysis—are mild or absent, since the lungs are protected against congestion by the low fixed output from the right ventricle. Conversely, when the tricuspid lesion is only moderate (cases 2 and 3), symptoms due to the mitral-valve lesion dominate the clinical picture, and the presence of a significant tricuspid lesion may become obvious only after a successful mitral valvotomy (case 2). Thus in any case

of combined mitral and tricuspid stenosis the presenting symptoms depend on the relative severity of the lesions.

Tricuspid stenosis raises venous pressure, and in cases with sinus rhythm large presystolic *a* waves appear in the jugular venous pulse; these are similar to the giant *a* waves of pulmonary stenosis and pulmonary hypertension and indicate right atrial hypertrophy. Presystolic hepatic pulsation may be found and must be distinguished from the systolic hepatic pulsation of predominant tricuspid incompetence. In advanced cases the liver may be the seat of cardiac cirrhosis, and a bronzed coloration of the head and neck (Altschule and Budnitz 1940) or frank icterus may be noted. Characteristically, a rumbling diastolic murmur is heard at the left border of the sternum, but there may be difficulty in distinguishing it from the concomitant mitral diastolic murmur; it is said to be accentuated during inspiration and by turning the patient to the right (Chesterman and Whitaker 1955). The opening snap of the tricuspid valve may be heard (Kossmann 1955). According to Wood (1950) the most striking feature of tricuspid disease is that there may be gross physical signs suggesting right ventricular failure in patients who are practically free from symptoms. A successful combined mitral and tricuspid valvotomy may unmask an aortic valvular lesion. In case 1 no murmur was audible before operation in the aortic area, although a faint early diastolic murmur was audible at Erb's point. After operation systolic and diastolic murmurs were heard in the aortic area although there was no alteration in the pulse pressure. The postoperative appearance of these murmurs was clearly due to improvement in the hæmodynamic state, and in particular to augmentation of the left ventricular stroke volume.

When tricuspid stenosis is suspected on clinical examination, confirmatory evidence may be obtained from fluoroscopy, electrocardiography, and cardiac catheterisation. Fluoroscopy reveals enlargement of the right atrium. Enlargement of the left atrium and of the right ventricle is due to the associated mitral lesion, and when the tricuspid stenosis is extreme (case 1) these changes may be disproportionately slight for the degree of mitral obstruction present. In patients with sinus rhythm the electrocardiogram shows the peaked P waves of right atrial enlargement (fig. 1); evidence of right ventricular hypertrophy is slight or absent.

Cardiac Catheterisation

That protection from the hæmodynamic disturbances of mitral stenosis results from concomitant tight tricuspid stenosis is shown by the catheter findings in case 1. Although the mitral stenosis was undoubtedly severe at the initial examination in 1954, the pulmonary vascular pressures were subnormal (pulmonary "capillary" 1 mm. Hg, pulmonary artery at rest 5 mm. Hg, pulmonary artery during exercise 9 mm. Hg). On the second occasion, when there was tight mitral stenosis, the catheter could not be manœuvred into the pulmonary artery, because it was impeded by the tricuspid stenosis; however, the right ventricular systolic pressure was only 15 mm. Hg (fig. 2), and the mean pulmonary artery pressure could therefore not have exceeded 10–12 mm. Hg.

Fig. 5—Superimposed tracing from atrial and ventricular pressure records (case 1).

Hæmodynamic changes on both sides of the tricuspid valve can best be studied according to the method of Ferrer et al. (1953) by redrawing and superimposing pressure tracings from the atrium and ventricle (fig. 5). This method is valid, since in case 1, the cardiac cycle was of constant duration (1·22 sec.) in each tracing and there was very little respiratory fluctuation.

In the normal heart the right atrial pressure equals the right ventricular end-diastolic pressure. However, in case 1 the mean right atrial pressure is 10 mm. Hg higher than the ventricular end-diastolic pressure and 5 mm. Hg higher than the ventricular mean pressure. The composite diagram shows that throughout ventricular diastole there is a constant atrioventricular pressure-gradient of not less than 8 mm. Hg. At the end of ventricular diastole, when the pressure is 0 mm. Hg, the corresponding right atrial pressure (Z point) is 12 mm. Hg. There is delay in the closure of the tricuspid valve, with corresponding lengthening of the period of isometric contraction of the right ventricle. The giant *a* wave 17 mm. in height is caused by powerful contraction of the hypertrophied right atrium. There is a rapid transient fall in intra-atrial pressure at the end of atrial systole; this is regarded by Yu et al. (1956), among others, as an exaggeration of the X descent following vigorous systole in a distended right atrium. No fall occurs in intra-atrial pressure at the opening of the tricuspid valve. This provides confirmatory evidence of extreme tricuspid stenosis which prevents sudden discharge of blood into the right ventricle in early diastole.

The pressure changes during the cardiac cycle in case 3 are similar but less (fig. 4). The *a* wave measured 10 mm. Hg and the pressure during atrial diastole is 5 mm. Hg. Since the ventricular end-diastolic pressure is 0 mm. Hg, there is a 5 mm. Hg pressure-gradient across the valve. The absence of any rise in intra-atrial pressure during ventricular systole indicates that there is no significant tricuspid incompetence.

In case 2 successive cardiac cycles vary in length, and it is therefore impossible to superimpose tracings from atrium and ventricle. The right ventricular pressure (fig. 3) is 27/0 mm. Hg (mean 14 mm. Hg). Since the atrium is fibrillating, there is no *a* wave. However, there is a sustained rise in intra-atrial pressure coinciding with ventricular systole, which indicates significant incompetence. This is followed by a sudden drop in pressure to 5 mm. Hg, corresponding to the opening of the tricuspid valve, and then a gradual rise until the end-diastolic pressure of 8–10 mm. Hg is attained. The record thus demonstrates combined stenosis and incompetence.

Tricuspid Valvotomy

Hollman (1956) points out that incompetence complicates tricuspid stenosis more commonly than mitral stenosis; incompetence was absent in only 2 of the 9 published cases, including his own, for which information on this point was available. Further, the danger of producing incompetence at operation is probably greater than in the case of the mitral valve. Bailey (1955) and Chesterman and Whitaker (1955) advise that the anteroseptal commissure should not be divided, because it renders the valve mechanically inefficient and may lead to incompetence. It may therefore be advisable not to attempt complete relief of the stenosis; an orifice of 4 sq. cm. or more is probably adequate (Yu et al. 1956). Instrumental splitting of the tricuspid valve is usually necessary, since it is more leathery in texture than the mitral valve and is rarely calcified.

The history of case 1, in which the manifestations of severe mitral stenosis were obscured by tight tricuspid stenosis, indicates that mitral obstruction should always be sought and dealt with before tricuspid valvotomy. When this is done, the chances of pulmonary congestion and œdema due to loss of the "protective" effect of the tricuspid stenosis will be avoided.

The postoperative course of case 1 was complicated by extreme hypotension and hepatorenal failure. The cause

of the hypotension remains obscure; there had been no technical difficulty, excessive loss of blood, or hypotension during the operation. There was no hæmoglobinuria or other evidence of incompatible blood-transfusion. The long-continued postoperative hypotension was refractory to blood-transfusion and to intravenous infusion of *l*-noradrenaline and hydrocortisone. After recovery from the hypotensive state, hepatic and renal function rapidly returned to normal. It might be postulated that, because of the preoperative hepatic congestion, unusual hepatic anoxia developed at operation or in the immediate post-operative period with resultant excessive production of vasodepressor material.

Summary

Tricuspid stenosis is a not infrequent complication of mitral stenosis. The clinical features of combined stenosis of the mitral and tricuspid valves depend on the relative severity of the lesions.

Three cases of tricuspid stenosis are reported. In one the condition became apparent after successful mitral valvotomy. In another, tight tricuspid stenosis completely obscured the changes in the lesser circulation expected from the presence of tight mitral stenosis.

The clinical and hæmodynamic features of stenosis of the tricuspid valve are discussed.

An unusual hypotensive state following combined mitral and tricuspid valvotomy is reported.

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RENAL FUNCTION IN PROSTATISM

OSCAR OLBRICH
M.D., Ph.D. Edin., F.R.C.P.E.
CONSULTANT PHYSICIAN

E. WOODFORD-WILLIAMS
M.D. Lond., M.R.C.P.
NUFFIELD RESEARCH FELLOW AND ASSISTANT PHYSICIAN

R. E. IRVINE
M.D. Camb., M.R.C.P.
ASSISTANT PHYSICIAN

D. WEBSTER
BIOCHEMIST
GERIATRIC UNIT, GENERAL HOSPITAL, SUNDERLAND

OBSTRUCTION to the flow of urine has often been studied in experimental animals, but little is known about its effects on renal function in man. The increasing incidence of prostatism in an ageing population provides a convenient opportunity to study this subject, and the development of reliable single-injection methods for the measurement of glomerular filtration-rate (G.F.R.), renal plasma-flow (R.P.F.), and maximal tubular excretory capacity (Tm) has simplified the technical problems involved (Robson et al. 1949a and b, Ferguson et al. 1950, Olbrich et al. 1950a).

Using these methods, Olbrich et al. (1950b) studied the effect of age on renal function, and showed that with advancing years G.F.R., R.P.F., and Tm were all decreased.

We record here some observations of renal function in elderly patients with prostatism in an attempt to assess the effect on the kidney of obstruction to the flow of urine. In addition to obstruction a further factor—infection—has had to be taken into account in many of the patients. In a few observations have been made before and after prostatectomy.

To exclude the effect of hypertension, which itself interferes with renal function in the elderly (Olbrich et al. 1950b), we have confined our attention to patients with normal blood-pressures.

Methods

60 men with chronic urinary obstruction due to prostatic enlargement were investigated. The average age was 72 (range 58–86). The main symptoms were frequency and difficulty in micturition, and all patients had some prostatic enlargement. This was due to benign hyperplasia in 51 and to carcinoma in 9. The diagnosis was confirmed at operation in 34, at cystoscopy in 31, and at necropsy in 3.

Three renal functions were studied: (1) glomerular filtration-rate, which was measured by the method of inulin clearance (C_{In}); (2) renal plasma-flow, which was estimated by the method of diodone clearance at low concentrations (C_d); and (3) maximal tubular excretory capacity, which was estimated by the use of diodone in high plasma concentration (Tm_d).

The methods, analytical technique, formulæ, and calculations have been described previously (Olbrich et al. 1950c). The urine was collected by catheter to avoid inaccuracies caused by residual urine and incomplete emptying of the bladder. All values were reduced to the standard of 1·73 sq. m. surface area.

The renal-function tests were carried out in the early morning after an overnight fast. No breakfast was allowed, but the patient was given about half a litre of weak tea before the test, followed by 150 ml. of water every half to one hour during the investigation. In this way hydration was achieved and the patients were able to maintain a good flow of urine, averaging 3–5 ml. a minute.

Routine observations in all cases included a bacteriological examination of the urine and a record of the body-temperature, blood-pressure, and hæmoglobin, hæmatocrit, plasma-protein, and blood-urea levels.

Results

The G.F.R. was successfully estimated in all 60 patients. The tests involving diodone, especially in high concentration, were in general well tolerated by the patients, but occasionally they led to considerable falls in blood-pressure. In spite of this reliable estimates of the R.P.F. was achieved in 55 patients, and of Tm in 44.

The urine was not infected in 32 patients and infected in 28. The average age of the uninfected group was 70 (58–81), and of the infected 74 (65–86). The range and average of the hæmoglobin, blood-pressure, plasma-proteins, and blood-urea of the patients in these two groups are shown in table I.

In normal elderly men G.F.R., R.P.F., and Tm were all reduced to about three-quarters of the values in normal young adults (table II).

TABLE I—MEN WITH PROSTATIC ENLARGEMENT: AVERAGE AND RANGE OF HÆMOGLOBIN, BLOOD-PRESSURE, PLASMA-PROTEINS, AND BLOOD-UREA

—	No.	Hæmoglobin (g. per 100 ml.)	Blood-pressure (mm. Hg.)	Plasma-proteins (g. per 100 ml.)	Blood-urea (mg. per 100 ml.)
Uninfected	32	11·3 (9·7–14·8)	153/84 (110/80–180/90)	6·9 (6·4–7·7)	50 (21–103)
Infected ..	28	10·5 (5·2–14·7)	152/87 (120/80–190/100)	6·7 (5·2–8·1)	47 (17–184)

TABLE II—RENAL FUNCTION IN MEN WITH PROSTATIC ENLARGEMENT WITH AND WITHOUT INFECTED URINE, COMPARED WITH NORMAL YOUNG AND AGED MEN

—	Age	G.F.R. (ml. per min.)				R.P.F. (ml. per min.)				Tm_d (mg. I per min.)			
		No.	Mean	S.D.	% normal	No.	Mean	S.D.	% normal	No.	Mean	S.D.	% normal
Normal young men *	20–39	9	126	16·7	100%	9	535	78	100%	8	41	7·4	100%
Normal aged men *	65–83	9	94	23·6	74%	8	419	133	78%	8	31	5·5	76%
Men with prostatic enlargement (uninfected)	58–81	32	64	23·0	51%	32	275	84	52%	22	32	11·6	78%
Men with prostatic enlargement (infected)	65–86	28	49	20·9	39%	23	219	82	41%	20	18	8·4	44%

* Figures from Olbrich et al. (1950b).

In the uninfected prostatic group there was a striking contrast between the tubular function, which was well maintained at levels normal for the aged, and the G.F.R. and R.P.F., which were reduced to about two-thirds of the levels normal for the aged and to about half those of normal young adults.

In the prostatic patients with infected urine, on the other hand, all three functions were diminished to about half of the normal for the aged and to about 40% of the normal for young adults.

The differences for all three functions between the infected and the uninfected are statistically significant, especially that for tubular function, which exceeds the 0·1% level of significance.

Derived Ratios

C_{in}/C_d.—The G.F.R. divided by the R.P.F. is termed the filtration fraction and indicates the proportion of glomerular filtrate formed from each 100 ml. of plasma flowing through the kidney. This fraction remained relatively constant at about 25% in the normal subjects, whether young or old, as well as in the patients with prostatism (table III). The slight difference between the infected and the uninfected patients with prostatic enlargement was not statistically significant.

C_d/Tm_d.—The ratio between the R.P.F. and the maximal tubular excretory-capacity for diodone gives a measure of the amount of plasma cleared of diodone per unit of functioning tubular tissue. The ratio was slightly smaller in the prostatic patients, especially in the infected group, but none of the differences were statistically significant.

C_{in}/Tm_d.—The ratio between the G.F.R. and the maximal tubular excretory-capacity for diodone gives a measure of the amount of glomerular filtrate per unit of functioning tubular tissue and provides an estimate of tubular efficiency in relation to glomerular activity. The ratio was slightly less in the prostatic patients, especially the uninfected ones, but the difference was not statistically significant.

Effect of Operation

12 of the patients who were submitted to prostatectomy were re-examined ten to ninety days after operation. 10 were uninfected and 2 were infected.

The G.F.R. increased in 6, decreased in 5, and was unchanged in 1 patient (table IV). The mean change was an increase of 13% (not statistically significant). The R.P.F., on the other hand, increased in every case save 1 by a highly significant average of 29%.

As a result of the increase in R.P.F. relative to the G.F.R., the filtration fraction fell after operation from a mean of 30% to 26%.

Estimation of the Tm before and after operation was technically satisfactory in only 3 patients. In these the excretion of diodone rose from an average of 29 (25, 43, 18) mg. iodine per minute to an average of 36 (35, 52, 22) mg. iodine per minute—an average increase of 28% (40%, 22%, 22%).

TABLE IV—EFFECT OF PROSTATECTOMY ON GLOMERULAR FILTRATION-RATE AND RENAL PLASMA-FLOW

Case	G.F.R. (ml. per min.)			R.P.F. (ml. per min.)		
	Before	After *	Change %	Before	After *	Change %
1	126	126	± 0%	240	300	+ 30%
2	30	60	+100%	157	274	+ 75%
3	24	27	+ 12%	50	100	+100%
4	69	67	— 3%	285	300	+ 5%
5	35	45	+ 28%	140	160	+ 12%
6	88	84	— 4%	314	331	+ 5%
7	60	76	+ 27%	224	235	+ 5%
8	76	65	— 14%	200	251	+125%
9	89	122	+ 37%	375	575	+ 54%
10	60	47	— 21%	243	309	+ 32%
11	60	54	— 10%	155	135	— 13%
12	68	70	+ 3%	223	268	+ 22%
Mean	66	70	+ 13%	218	270	+ 29%

*Time 13–90 days after operation (mean 57 days). Cases 1–10 uninfected; 11 and 12 infected.

Discussion

Our results show that in the elderly prostatic patient, chronic obstruction to the flow of urine leads to a reduction in R.P.F. and G.F.R. which is much greater than that caused by age alone. Tubular function, on the other hand, is unaffected unless the urinary tract becomes infected.

These findings are contrary to those of Lich (1942), who has conducted the only previous comparable study of renal function in prostatism. In a small series of 6

TABLE III—DERIVED RATIOS IN NORMAL YOUNG AND AGED MEN, AND IN AGED MEN WITH PROSTATIC ENLARGEMENT

—	Age	G.F.R./R.P.F. (filtration fraction)			R.P.F./Tm_d			G.F.R./Tm_d		
		No.	Mean	S.D.	No.	Mean	S.D.	No.	Mean	S.D.
Normal young men *	20–39	9	23·8	2·8	8	13·3	2·4	8	3·2	0·7
Normal aged men *	65–83	8	24·3	5·4	8	13·3	2·8	8	3·2	0·7
Men with prostatic enlargement (uninfected) ..	58–81	32	24·5	8·4	22	11·2	4·2	22	2·24	0·66
Men with prostatic enlargement (infected) ..	65–86	23	26·8	9·0	15	10·4	7·5	20	2·65	0·72

* Figures from Olbrich et al. (1950b). S.D. = standard deviation.

patients he found that the glomerular function, as judged by inulin clearance, was only slightly reduced, whereas tubular function was much reduced but improved following surgical relief of the obstruction. The reason for these differences may lie in the factor of infection, which Lich does not mention, or in the method by which tubular function was estimated, for he used phenol red and we used diodone. The reduction of tubular function in the presence of infection is almost certainly due to pyelonephritis. This is known to affect the function of the tubules more than any other part of the kidney (Bradley et al. 1950, Bodansky and Bodansky 1952, Brod 1956).

In 12 patients, prostatectomy led to a decisive improvement in R.P.F. but had no significant effect on the G.F.R. The filtration fraction was accordingly reduced. Successful estimations of tubular function before and after operation were achieved in only 3 of our patients, but in each there was a striking improvement (averaging 28%). This is in line with Lich's results.

Our findings have some interesting affinities with experimental results of obstruction to the ureter. Selkurt et al. (1952) showed that a moderate increase in ureteral pressure to 52 cm. of water caused a slight fall in R.P.F. and G.F.R., but did not affect tubular function, a pattern similar to the findings in our uninfected patients. Similarly, Share (1952) found that, in dogs, increasing the pressure in the ureter to 20–30 mm. Hg caused a reduction in R.P.F. and G.F.R. The G.F.R. was more affected than the R.P.F., with a consequent reduction in the filtration fraction. In our patients both these functions were affected equally, and the filtration fraction was not significantly changed. Unfortunately, Share made no observations on the function of the tubules.

The mechanism by which R.P.F. and G.F.R. are reduced in prostatism is a matter for speculation. It may be due to a nervous reflex relating urinary output to the pressure in the bladder, for it has been shown experimentally that distension of the bladder leads to a reduced output of urine, even after the ureters have been divided so as to exclude any hydrostatic connection between the bladder and the kidney (Tolls and Dille 1955). It may be due to a decrease in effective filtration-pressure within the lumen of the nephron, a view which looks back to the 19th century and the days of Ludwig and Heidenhain (Winton 1937); or it may be mediated by an effect on the venous system of the kidney. An increase in pressure in the ureter is known to increase the intrarenal interstitial pressure (Gottschalk 1950), and this might be expected to compress the venules which lie within the substance of the kidney. It is also known that experimental obstruction of the venous outflow from the kidney leads to a decrease in renal blood-flow and glomerular filtration, but has no effect on the function of the tubules (Winton 1931). Changes of this kind were seen in our patients with chronic obstruction for as long as the urine remained uninfected, and the possibility is also supported by the effect of prostatectomy: for an increase in the R.P.F. was the principal postoperative change and there was no significant alteration in the G.F.R. such as might have been expected from a simple fall in effective filtration-pressure.

Whether any of these mechanisms in fact operate in the human kidney has not been definitely established and must remain a matter for future research. Our findings show only that there is some general correspondence between the effects of experimental obstruction to the flow of urine in laboratory animals and the natural event in man. They also go some way to suggest that compression of the renal venules by increased interstitial pressure may be the primary mechanism by which kidney function is diminished in prostatism.

Summary

Single-injection methods with inulin and diodone were used to investigate the glomerular filtration-rate, renal plasma-flow, and maximal tubular excretory-capacity in 60 elderly men with chronic urinary obstruction due to prostatic enlargement.

The glomerular filtration-rate and renal plasma-flow were reduced to about half the levels found in normal young adults and to about two-thirds of the levels found in healthy aged men. Where the urine was infected these levels were reduced still further.

In the absence of infection, tubular function was well maintained at levels normal for healthy aged men, but when the urinary tract became infected tubular function was affected to the same degree as the glomerular filtration-rate and the renal plasma-flow.

In 12 patients examined before and after prostatectomy, there was a highly significant increase in the renal plasma-flow after operation, but there was no significant change in the glomerular filtration-rate. Tubular function was much improved in the only 3 patients for whom technically satisfactory estimations were obtained.

These findings are discussed in relation to experimental urinary obstruction in animals. Compression of the renal venules by increased interstitial pressure within the kidney with consequent obstruction to the renal plasma-flow may be the primary mechanism.

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SOME MODIFICATIONS IN PLASTER-OF-PARIS TECHNIQUE

R. S. GARDEN
M.B. Aberd., M.Ch.Orth. Lpool, F.R.C.S.E.
CONSULTANT ORTHOPÆDIC SURGEON, ROYAL INFIRMARY, PRESTON

DURING the years of war, plaster-of-paris played a significant part in the management of battle casualties, and lent itself readily to many of the modifications in treatment which were introduced. The modifications described below were first developed during the Middle East campaign in response to some of the problems which beset the treatment of fractures at that time. They constitute no major departure from normal routine, and were at first regarded as improvisations only. In civilian practice, however, they have proved to be of more permanent worth, and publication is now undertaken in the hope that they may continue to be of occasional value.

Application

Plaster-of-paris casts are normally applied by unrolling wet individual bandages around body or limb, and there is probably no better way of securing a smooth, strong, and snugly fitting cast. The method is time-consuming,

however, and there are occasions when this becomes of more than casual importance. At the end of a long operation the additional twenty minutes' anæsthesia while a thoracobrachial or a hip-spica plaster is applied and allowed to set may indeed be vital. This was particularly true in field surgery, where it was imperative to avoid all factors likely to increase the degree of "shock." If, as has been shown, the mere transfer of a gravely wounded man from operating-table to stretcher may cause an immediate fall in blood-pressure, how much more disturbance must follow when such a patient is suddenly seated upright to facilitate the application of a shoulder spica? This upright position dare not be long maintained in a patient whose blood-pressure is dangerously low following operation for a severe upper-limb injury, and, it may be, for a penetrating wound of the chest as well.

Of the various methods intended to hasten the application of this type of plaster cast, the "slab" technique is most widely used. In actual practice, however, this technique saves but little time and is difficult to manage single-handed. Moreover it offends against the architectural preference for the strong tubular cast of uniform thickness as compared with one of unequal consistency. For the same reasons the "pattern" technique—so well described by Trueta (1944)—is not wholly satisfactory. Tailoring of the individual patterns is in itself a specialised task, and preparation of the patterns beforehand is seldom practicable if an accurate fit for every patient is to be obtained—and an accurate fit is essential in patients who may embark on a lengthy journey, without skilled supervision, within a few hours of injury.

The following technique has proved satisfactory in a considerable number of cases, and it is felt to be a safe and simple method of rapidly completing a plaster cast. By its means a shoulder or hip spica may be applied in a matter of minutes:

Three plaster bandages of the proprietary type are loosely rolled into one (fig. 1), and a stock of both 4-inch and 6-inch sizes is prepared and stored in airtight tins. When required, these composite bandages are well soaked in water and applied in the usual way. Care is taken to smooth each three-layer turn, as it is unrolled, to avoid "onion-peeling," and each turn of the bandage is made to overlap the adjacent half of the preceding one. This produces a cast uniformly six layers thick, and any additional thickness which may be desired at

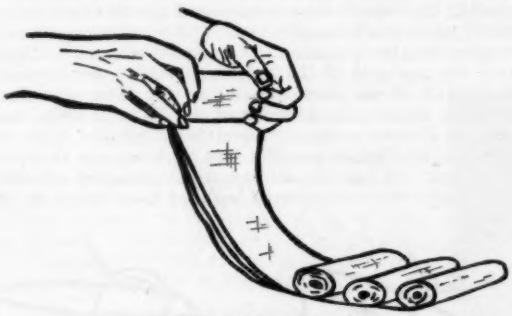

Fig. 1—Three-layer bandaging.

points of stress is obtained by overlapping the turns at still closer intervals. In practice, this type of plaster dries rapidly, and cracking of the cast by inadvertent movement is minimised.

Although the urgency of the field surgical unit no longer obtains, these composite bandages may still be used for the larger types of plaster where speed of application is of advantage. The smoothness of the inner surface of the cast cannot, obviously, be so well controlled as when single bandages are used, and the use of composite bandages for skin-fitting plasters is therefore inadvisable. This need prove no real disadvantage, however, for it is clearly undesirable, in any event, to enclose a recently injured part of the body in a rigid and unyielding case.

Tibial Weight-bearing Plaster

This modification differs from the ordinary type of walking-plaster in so far as the body-weight is borne by the tibial tuberosities—much as in the case of a below-knee amputation—whilst the foot and ankle remain completely free. It was originally devised to relieve the tedium of prolonged recumbency in soldiers who had sustained bilateral fracture of the os calcis after a land-mine explosion and were being treated by non-weight-bearing exercises in bed. Since then it has proved equally effective in the treatment of other injuries of the foot and ankle where direct weight-bearing is contra-indicated.

The value of non-weight-bearing exercises is enhanced by this plaster, and the patient becomes ambulant without danger of direct weight-bearing on the fracture site. Active movements are encouraged as the patient walks, and, since a sock and soft shoe may be worn, the resulting gait often looks surprisingly normal.

Application of the plaster requires more than ordinary care:

A strip of thick adhesive felt, 3 inches wide, is first applied round the limb at the level of the tibial tuberosities, and a similar strip is placed in position just above the malleoli. The area which remains exposed between these two felt strips is protected by a layer of cotton-wool, and a light plaster is then applied. Half an inch of felt is left uncovered at either end, and the plaster is firmly moulded in the region of the tibial tuberosities and over the supramalleolar area. An ordinary Böhler walking-iron is then fixed in position, a clearance of at least 2 inches being left between the patient's heel and the bend of the iron (fig. 2).

Fig. 2—Tibial weight-bearing plaster.

In this way a cast is fashioned which is prevented from riding upwards by the cone-shaped tibial tuberosities and from slipping downwards by the flare of the malleoli. When the patient begins to walk, he soon discovers that dorsiflexion of the foot tightens the calf muscles and thus tends to fix the limb more firmly in the cast. Any tendency to foot-drop is thus corrected.

Some "pistoning" of the limb within the cast is inevitable, but this will be slight if the cast has been carefully moulded. Undue up-and-down movement will produce friction sores, but these may be largely prevented by the use of an aluminium walking-iron in conjunction with as light a cast as possible.

Swelling as a result of dependency has not proved troublesome when this plaster has been used, but gross swelling which has been present before its application has almost always been aggravated. Such swelling should be allowed to subside, therefore, before the plaster is applied. Too much walking is best discouraged at first, since the skin over the head of the tibia requires a little time in which to accustom itself to this unusual means of progression.

Wedging

The expedient of wedging a plaster cast to correct faulty alignment of a fracture has long been practised and is of accepted value. Where the adjustment required is small, wedging provides a means of correction without resort to removal and reapplication of the whole cast with, as often happens, failure to effect improvement in position. When wedging is done by guesswork, the same

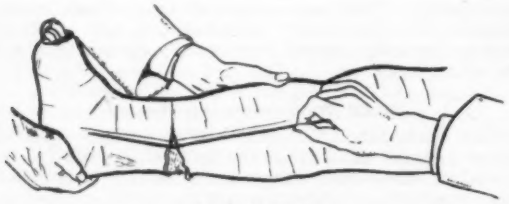

Fig. 3—Wedging.

failure to achieve correction at the first attempt is not unusual. Fluoroscopy provides an accurate means of control in gauging the amount of wedging required, but, apart from the image intensifier, its use is precluded by the danger which exists both to the patient and to the surgeon's hands.

Adjustment of alignment may be found possible at the first attempt in the following way:

A straight line is first pencilled on the appropriate surface of the plaster, and, by reference to the X-ray film, the site of fracture is carefully determined, and its position is marked on the cast. A Kirschner wire is then angulated to conform precisely with the deformity as shown on the X-ray film. The cast is divided transversely at the fracture site for at least half its circumference on the side opposite the angulation. Correction by manipulation is then made in the usual way. While this is being done, the Kirschner wire is held over the cast and manipulation is continued until the straight line previously drawn on the plaster angulates to correspond with the bend of the wire (fig. 3). Full correction should then have been obtained. The wedge is filled with cotton-wool, and a plaster bandage is applied to restore the integrity of the cast.

Alternatively the angle of deformity may be drawn on the cast and correction continued until the angle is completely reduced.

When both lateral and anteroposterior angulation are present, the above procedure may be duplicated. It is preferable to cut the plaster transversely and to open the cut into a wedge, which increases the capacity of the cast, rather than to remove and then close a wedge, which reduces the capacity of the cast.

Gross faults in alignment are, of course, unsuitable for correction by wedging, and anæsthesia is best avoided. The manipulation need not be painful, and the conscious patient can give adequate warning if undue pressure is exerted.

Plaster-of-paris and the Thomas Splint

The combination of plaster-of-paris with the Thomas splint has already been well exemplified in the "Tobruk" plaster (Jack 1944), which did so much to ease the evacuation of severely wounded Service personnel. Complete comfort for those patients was not always possible, however, because the rings fitted to the Thomas splints were too big. In the field it was customary to fill the interval between the outer half of the ring and the patient's thigh with shell dressings, which were retained in position by the encircling plaster. When, however, the Thomas splint was used with fixed traction for the definitive treatment of the fractured femur, some more stable form of adjustment became necessary. The efficiency of the Thomas splint depends almost entirely on a well-fitting ring which allows counter-pressure to be maintained against the tuber ischii. Much has been done to discredit this splint by the use of unduly large rings which slip upwards to press in the groin and perineum almost as soon as they are applied. This gives rise to intense discomfort, and the patient's inability to tolerate such splintage can readily be understood.

In the case of the walking-calliper, the problem of ring size was solved early in the war by the introduction of the Charnley adjustable splint (Charnley 1947)—an appliance still very much in active service. The same adaptability in the Thomas splint, however, was not at that time available, and as a substitute for a properly fitting ring the following manœuvre was then employed.

A strip of adhesive felt, about 8 × 3 in., is placed on the skin over the anterolateral aspect of the upper thigh, and the ring of the splint is then pulled forwards and outwards until it abuts comfortably against the tuber ischii. While the ring is maintained in this position, and before the extensions have been tightened, the interval between the felt and the ring is filled with wet unrolled plaster-of-paris bandages. These are moulded by lateral pressure until they conform to the outer aspect of the thigh and to the inner surface of the ring. A thin plaster slab is then applied over both ring and bandages to hold the latter in place (fig. 4).

In this way the splint is made to fit the particular limb to which it has been applied, and the patient's comfort is assured.

Subtrochanteric Fracture of Femur

In the management of fractures of the upper femoral shaft, where persistent abduction of the proximal fragment is so often troublesome, the use of a well-fitting ring is essential. Control of this abducted upper fragment is not easy to obtain without operation, but the lower fragment remains under control and can be readily abducted to bring it into line with the upper fragment.

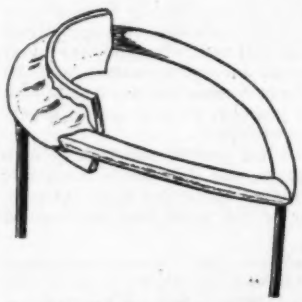

Fig. 4—Modification of Thomas splint.

A well-fitting ring which presses firmly against the tuber ischii and conforms to the contour of the thigh over the rest of its circumference cannot be made to tilt except by a corresponding tilt of the pelvis. If, therefore, the angle between the side-bars of the splint and the ring is decreased, the limb will be abducted accordingly. This alteration of angle can best be achieved by dividing the outer bar of the splint at the level of the fracture and bending the inner bar outwards until the required degree of abduction has been obtained. The splint is then reconstituted by the application of a plaster-of-paris bandage over the cut ends of the outer bar, where they overlap as a result of the altered angle (fig. 5). This procedure virtually amounts to wedging of the Thomas splint and is a less clumsy means of correcting alignment than by widely abducting both splint and limb beyond the edge of the bed. It has the additional advantage of allowing the patient to be transferred without disturbance of the fracture.

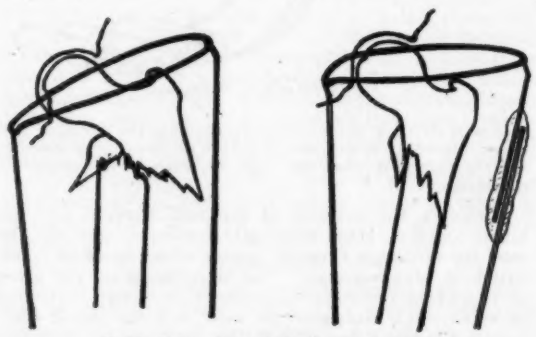

Fig. 5—Subtrochanteric fracture of femur.

Toe Protection

This simple expedient was introduced to counteract the ill effects of badly applied plaster-of-paris platforms which maintained the toes in forced dorsiflexion and thus led to stiffness and, on occasion, to permanent limitation of movement.

Fig. 6—Toe protection.

It consists of a loop of plaster (fig. 6) which bridges the toes and protects them from the weight of bedclothes and accidental injury. Bed-cradles are seldom practicable when a patient is evacuated by ambulance; nor, in civilian practice, are they always available in the home. The weight of blankets can force the toes into plantar flexion and initiate deformity very easily. With this loop, the toes remain free, and flexion contracture or other deformity has not been noted as a result of its use. The plaster platform, never fully justified, is best reserved for sciatic or peroneal paralysis when active support is really required.

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CAPILLARY THINNING AND HIGH CAPILLARY BLOOD-PRESSURE IN HYPERTENSION

JACOB LANDAU
M.D. Vienna
CHIEF ASSISTANT PHYSICIAN, DEPARTMENT OF OPHTHALMOLOGY

ELI DAVIS
M.Sc., M.D. Manc., M.R.C.P.
CHIEF, MEDICAL OUTPATIENT CLINIC C

ROTHSCHILD HADASSAH UNIVERSITY HOSPITAL, JERUSALEM, ISRAEL

THE nail-bed capillaries have been studied in hypertension by Boas and Mufson (1923) and Brown and Roth (1927). Recently emphasis has shifted to the investigation of conjunctival capillaries. In hypertension Lack et al. (1949) described severe thinning of the conjunctival capillaries, and Lee and Holze (1951) published photographs of narrowed conjunctival capillaries.

We have examined the morphology of both conjunctival and nail-bed capillaries and capillary pressure in the nail-bed in hypertensive and control patients. The relation of the capillary findings to the cardinal clinical features of hypertension was studied.

Material and Methods

100 outpatients with established diastolic hypertension were studied and followed up for periods varying from one to five years. Excluded from the study were patients in whom the fundus could not be seen because of cataract and corneal opacities. Also excluded from the present report were patients with high systolic pressure but normal diastolic pressure, patients with nephritis, and patients with hypertension complicating diabetes mellitus.

In all the patients attention was paid to presence of proteinuria; changes in the fundus, classified by the method of Keith et al. (1939); and symptoms and signs and tests of cardiac and cerebral complications. All the patients with proteinuria underwent microscopy of the urine and relevant blood tests, and also radiography of the kidneys where clinically indicated.

Heart-disease was termed severe in the presence of congestive cardiac failure or auricular fibrillation or severe coronary disease or if there was severe cardiac enlargement radiologically or if the electrocardiogram was decidedly pathological. There were 37 such patients.

The cerebral complications noted were gross intellectual deterioration with hypertensive encephalopathy in 2 patients and hemiparesis or hemiparalysis in 5 others.

The nail-bed capillaries were examined at magnifications of 50–150. The bulbar conjunctiva was examined with a slit-lamp at magnifications of 12, 24, and 48. In many patients the nail-bed and conjunctival capillaries were photographed. The diameter of the lumen of the capillaries was measured by using clear photographs incorporating an ocular scale in which the actual distance represented between divisions and the actual width represented by a line between the divisions had been measured.

Thus in the nail-bed the width of a line in the ocular scale at 60 × was 4·5 μ, and the distance between the beginning of one line and the beginning of the next was 17 μ.

The corresponding figures for the conjunctiva at 24 × were 6·7 μ and 25 μ. Photographs were enlarged and the capillaries measured against line and division. In the nail-bed the "arteriolar" limb of the capillary was measured.

With practice a close estimate of capillary width could be made at the time of examination in terms of width of line and space of ocular scales.

Capillaries were put in two groups according to diameter: one group included normal capillaries with a range of diameter 5–12 μ (fig. 1) and moderately thin capillaries with a range of diameter 3·5–5 μ (fig. 2); and the second group comprised very thin capillaries with diameters of 2–3·5 μ (fig. 3).

Although the methods of measurement are subject to appreciable error, the inaccuracies were not such as to invalidate the range of values given. In view of the natural variation in width of the capillaries the classification was only applied to the conjunctiva and nail-bed as a whole if the findings were characteristic of most of the capillaries seen.

The capillary blood-pressure was taken by the method of Davis (1953), and with practice the method became a routine procedure.

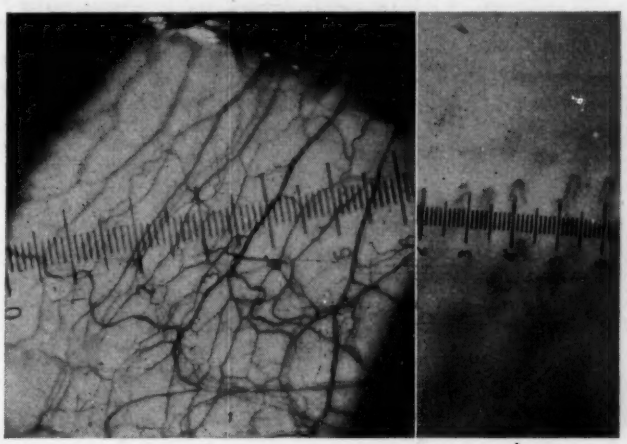

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Fig. 1—Normal capillaries: *a*, conjunctival (smallest vessels in spaces framed by darker venules) (× 12); *b*, nail-bed (× 40).

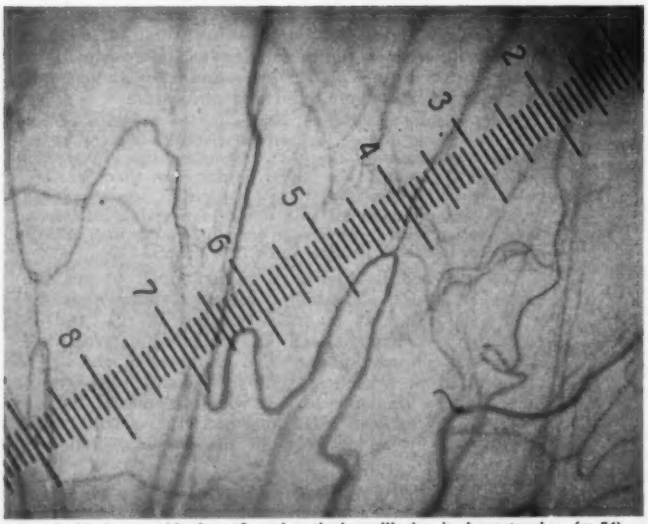

Fig. 2—Moderate thinning of conjunctival capillaries in hypertension (× 54).

To estimate capillary pressure the principle of ordinary clinical sphygmomanometry was adapted for the nail-bed. A manometer cuff made for the newborn infant's arm was attached to an ordinary sphygmomanometer and fastened round the second phalanx and distal interphalangeal joint of the finger. The nail-bed capillaries were observed under the microscope. The pressure in the cuff was quickly raised until all visible capillary blood-flow stopped. The pressure was then reduced until normal flow reappeared in several capillaries. This pressure was taken as the capillary pressure.

Capillary pressure less than 45 mm. Hg was considered normal (45 cases); pressure 45 mm. Hg or more was considered high (55 cases).

Of the 100 patients 28 were males and 72 females. There were 65 patients aged less than 60, and 35 aged 60 or more.

Results

The capillary blood-pressure and the diameter of the lumen of the capillaries were not related to the sex or age of our patients. The findings are set out in tables I–III, and the main statistical assessments in table IV.

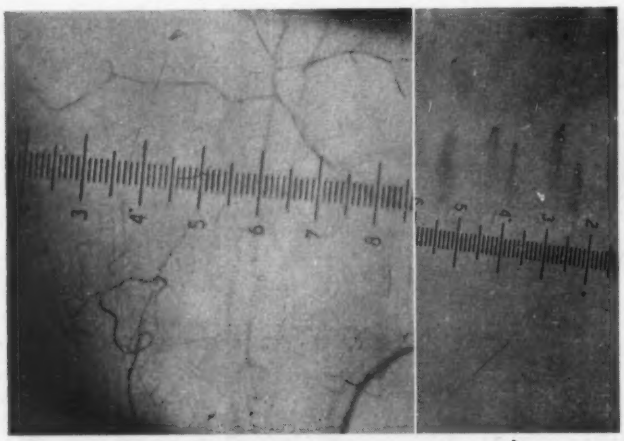

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Fig. 3—Severe hypertension: a conjunctival capillaries are less than 3 μ in diameter and invisible in photograph, smaller visible vessels being venules and arterioles, also very thin (× 37); b, nail-bed capillaries are very thin (× 40).

Fundus (table II)

A normal fundus was not found where the conjunctival capillaries were very thin. Grade-4 fundus was not found where the conjunctival capillaries were normal or moderately thin. Of the 10 patients with grade-3 or grade-4 fundus 8 had very thin conjunctival capillaries. Proteinuria was significantly associated with fundus grades 2, 3, and 4 (coefficient of association 0·58, χ^{2++}).

Capillary Thinning (table II)

This correlation between severe conjunctival capillary thinning and proteinuria was 0·45, which, though it just failed to be statistically significant, suggests a trend, and possibly in a larger series a significant correlation may be revealed.

Severe conjunctival capillary thinning showed a trend of correlation with fundus changes and a positive correlation with high capillary pressure.

Severe nail-bed capillary thinning had a negative correlation with proteinuria and no correlation with fundus changes but was significantly correlated with severe heart-disease (correlation 0·61, χ^{2++}), high capillary pressure, and severe conjunctival capillary thinning. The nail-bed capillaries were very thin in only 16 of 48 patients with very thin conjunctival capillaries.

TABLE I—RELATION OF FINDINGS IN HYPERTENSION TO PROTEINURIA

Finding	No proteinuria or traces only (69 cases)	Proteinuria (31 cases)
Diastolic pressure (mm. Hg):		
Less than 120	50	18
120 or higher	19	13
Fundus:		
Normal, stage 1	39	8
Stage 2, 3, 4	30	23
Nail-bed capillaries:		
No or moderate thinning	52	26
Very thin	17	5
Conjunctival capillaries:		
No or moderate thinning	41	11
Very thin	28	20
Capillary pressure:		
Normal	38	7
High	31	24

However, when severe thinning in the nail-bed was found it was mostly associated with severe thinning in the conjunctival capillaries.

The lumen of the capillary was assessed in 100 control medical outpatients with conditions unconnected with hypertension. Severe capillary thinning was seen in the conjuntiva in 3 and in the nail-bed in 3.

Capillary Pressure (table III)

The correlation between high capillary pressure and high diastolic pressure of 120 mm. Hg or more was 0·40, which although not statistically significant suggests a trend. The incidence of fundus stage 2, 3, 4 was significantly increased in the presence of high capillary pressure. As regards fundus 3 and 4, nine out of ten occurred in the presence of high capillary pressure.

High capillary pressure was found in 55 of the 100 hypertensives. In 69 patients with normal blood-pressure Davis (1953) found 8 with high capillary pressure.

High capillary pressure had a significant correlation with proteinuria (0·62, χ^{2++}), changes in the fundus (stage 2, 3, 4), severe

TABLE II—CAPILLARY THINNING IN CONJUNCTIVA

—	None or moderate (52 cases)	Very thin (48 cases)
Diastolic pressure (mm. Hg):		
Less than 120	38	30
120 or higher	14	18
Fundus:		
Normal	6	0
1	23	18
2	21	22
3	2	5
4	0	3
Capillary thinning in nail-bed:		
None or moderate	46	32
Severe	6	16
Capillary pressure:		
Normal	37	8
High	15	40
Heart-disease:		
None or moderate	37	26
Severe	15	22
Cerebral arteriopathy	1	6

thinning of nail-bed capillaries, severe thinning of conjunctival capillaries, and severe heart-disease. With the last-named the correlation was 0·47, $\chi^{2}+$.

Severe heart-disease complicating hypertension was positively associated with high capillary pressure and severe thinning of nail-bed capillaries. The correlation with the latter was 0·61, $\chi^{2}++$.

Of the 7 patients with cerebral arteriopathy 6 had severe capillary thinning and high capillary pressure. These figures are too small for statistical significance, but the trend is suggestive.

Discussion

In hypertension Lack et al. (1949) described extensive narrowing of the conjunctival capillaries with tubular thickening of walls and loss of normal distensibility. They claimed that 98% of hypertensives showed significant capillary changes. The severity of the pattern was correlated with the rise in diastolic pressures. Control patients showed minimal changes in 28%, but none showed the hypertensive pattern.

In the conjunctiva of hypertensive patients Lee and Holze (1951) found vasoconstriction of the minute arterioles and metarterioles. They described elongation, looping, and tortuosity of the true capillaries, including the smaller collecting venules.

A guide to the microscopic study of the conjunctiva in health and disease is found in the comprehensive study of Bloch (1956).

In hypertension, particularly with increasing proteinuria, Sieker et al. (1955) found a decreased retinal reactivity to raised oxygen tension in the blood. In the present study proteinuria was significantly associated with high capillary pressure and pathological changes in the fundus, and possibly with severe conjunctival capillary thinning. There was correlation between high capillary pressure in the nail-bed and severe thinning of the conjunctival and nail-bed capillaries. Although conjunctival capillaries were more often very thin than were nail-bed capillaries, there was correlation between severe conjunctival capillary thinning and severe nail-bed capillary thinning. Morphologically the conjunctival capillaries are those of a network in a membrane, whereas those of the nail-bed are individual loops seen in their whole length. In rheumatic fever Davis and Landau (1956) have shown that the conjunctival capillaries were a more sensitive index of systemic pathology than those in the nail-bed. Yet high capillary pressure in the nail-bed is closely related to both conjunctival and nail-bed severe capillary thinning and to the complications of hypertension.

TABLE III—CAPILLARY PRESSURE

—	Normal (45 cases)	High (55 cases)
Diastolic pressure (mm. Hg):		
Less than 120	35	33
120 or higher	10	22
Fundus:		
Normal	6	0
1	23	18
2	15	28
3	1	6
4	0	3
Capillary thinning in nail-bed:		
None or moderate	42	36
Severe	3	19
Heart-disease:		
None or moderate	34	29
Severe	11	26
Cerebral arteriopathy	1	6

The method of measuring capillary pressure described by Davis (1953) has proved useful in this study. Perhaps this method really measures the arteriolar pressure; but the values so obtained in healthy controls were the same as those found by Landis (1930) using the direct method of a microcannula in the capillary. However, since in some of the present patients the capillary pressure was nearly as high as the diastolic pressure, it is possible that precapillary arteriolar pressure was really being measured. Alternatively in certain circumstances the capillary resistance may be so increased as to bring the capillary pressure close to arteriolar pressure. Boas and Mufson (1923), studying capillary pressure in the nail-bed, mentioned this possibility. Our finding that with high capillary pressure the conjunctival capillaries were nearly always very thin may support this view.

TABLE IV—COEFFICIENT OF ASSOCIATION *

—	Diastolic pressure 120 mm. Hg or higher	Fundus 2, 3, 4	Nail-bed capillaries <3·5 μ	Conjunctival capillaries <3·5 μ	High capillary pressure
Diastolic pressure 120 mm. Hg or higher	..	0·85++	—0·005	0·24	0·40
Fundus 2, 3, 4	0·85++	..	0·04	0·36	0·58++
Nail-bed capillaries <3·5 μ	—0·005	0·04	..	0·59+	0·76++
Conjunctival capillaries <3·5 μ	0·24	0·36	0·59+	..	0·85++
High capillary pressure	0·40	0·58++	0·76++	0·85++	..

++ Significant on χ^{2} test at level <P 0·01.
+ ,, χ^{2} ,, ,, <P 0·05.
* By Margaret P. Yekutiel.

Of the 7 patients with cerebral arteriopathy 6 had severe capillary thinning and high capillary pressure. Byrom (1954) investigated in rats the pathogenesis of hypertensive encephalopathy. His fig. 14 illustrating diffuse and focal spasm in the smaller arteries, with intense thinning of the terminal arteries, in severe hypertension resembles our findings in the precapillaries and capillaries in severely hypertensive patients.

The evidence submitted here shows that the capillaries are altered in hypertension. High capillary pressure measured in the nail-bed is significantly associated with some of the chief complications of hypertension—proteinuria, fundus stage 2, 3, and 4, and severe heart-disease—and possibly with cerebral arteriopathy. High capillary pressure is not closely associated with diastolic pressure of 120 mm. Hg or more, although there is evidence of such a trend. Perhaps, once the diastolic pressure has reached 95 mm. Hg and remains persistently high, a further rise in diastolic pressure is not the main factor influencing capillary pressure. High capillary pressure is closely associated with severe capillary thinning. There is evidence, although in the main not statistically significant, that severe conjunctival capillary thinning may be associated with the same complications of hypertension as high capillary pressure.

This study shows the importance of investigating both conjunctival and nail-bed capillaries.

Summary

In 100 patients with hypertension and in control patients the capillaries of the nail-bed and conjunctiva were examined by capillary microscopy and with slit-lamp and often photographed.

The diameter of the lumen of the capillaries was measured, and the blood-pressure in the nail-bed capillaries was taken.

The range of diameter of normal capillaries was 5·0–12·0 μ, of moderately thin capillaries 3·5–5·0 μ, and of very thin capillaries 2·0–3·5 μ.

Very thin nail-bed capillaries were found in 22 and very thin conjunctival capillaries in 48 of the 100 hypertensives. In 100 control patients without hypertension very thin capillaries were found in the nail-bed in 3 patients and in the conjunctiva in 3 patients.

Capillary blood-pressure less than 45 mm. Hg was considered normal. Capillary pressure 45 mm. Hg or higher was considered high and was found in 55 hypertensives. High capillary pressure was not closely correlated with diastolic pressure of 120 mm. Hg or higher.

High capillary pressure had a significant correlation with proteinuria, changes in the fundus (stages 2, 3, 4), severe nail-bed and conjunctival capillary thinning, and severe heart-disease. There was a trend of association with cerebral arteriopathy. In 69 patients with normal blood-pressure high capillary pressure was found in 8.

Severe conjunctival capillary thinning had a trend of association with proteinuria, changes in the fundus, and cerebral arteriopathy.

Severe nail-bed capillary thinning was significantly correlated with severe conjunctival capillary thinning and severe heart-disease.

Severe capillary thinning was significantly correlated with high capillary pressure.

The combined study of both conjunctival and nail-bed capillaries was worth while.

Thanks are due to Mr. M. Ivri for photographs and skilled observations.

Note on Statistical Method

MARGARET P. YEKUTIEL, D.PHIL. Oxfd

The coefficient of association, Q, first suggested by Yule (Yule and Kendall 1947), represents a method for measuring the association between two attributes. For a fourfold table of the following form

Attribute	Attribute		Total
	B	b	
A	(AB)	(Ab)	(A)
a	(aB)	(ab)	(a)
Total	(B)	(b)	N

the formula for Q is: $$Q = \frac{(AB)(ab) - (Ab)(aB)}{(AB)(ab) - (Ab)(aB)}$$

The value of Q ranges from −1 to +1.

In the calculation of Q two values only were used for each variable; hence fundus was classified as (a) normal and stage 1, or (b) stage 2, 3, 4, and diastolic pressure as (a) below 120 mm. Hg, or (b) 120 mm. Hg or above.

Q, while it measures the intensity of association between two attributes, does not measure the statistical significance of the association. χ^2 tests were therefore made, and those associations which show a significance at the 0·05 and 0·01 levels are indicated in table IV.

References at foot of next column

PENICILLIN-RESISTANT STAPHYLOCOCCAL PERICARDITIS

E. A. NIEMAN
M.B. Lpool, M.R.C.P., D.C.H.
MEDICAL REGISTRAR, ROYAL SOUTHERN HOSPITAL, LIVERPOOL

UNTIL recently the prognosis of staphylococcal septicæmia was very poor, and pericarditis was a formidable complication. In a review of suppurative pericarditis, Streider and Sandusky (1941) remarked that the mortality for unoperated patients must approach 100%. Since antibiotics were introduced, most acute staphylococcal infections have been cured; but septic pericarditis is still a very serious complication, particularly if the organism is penicillin-resistant.

This paper records a case of penicillin-resistant staphylococcal septicæmia with pyopericardium, and discusses the relationship between septic pericarditis and constrictive pericarditis.

Results

A man of 49 had a carbuncle on his neck. Three weeks later, on April 28, 1955, he was admitted to hospital with general malaise, cough, and hæmoptysis. He was very ill with a temperature of 103°F, jaundice, and purpura of both legs. There was a discharging carbuncle on his neck, a pustule on his nose, severe cellulitis of the left elbow, and a subcutaneous abscess over the right elbow. There were bilateral axillary pleural rubs and coarse crepitations in the right axilla. The liver was tender and enlarged three fingers below the costal margin: the spleen was tender and palpable. There were no cardiac murmurs.

A diagnosis of fulminating staphylococcal septicæmia was made, and penicillin (1½ million units 4-hourly) and streptomycin (1 g. b.d.) were given. Next day there were many further embolic skin lesions; he complained of headache and blurring of vision and there was neck stiffness on examination.

Investigations.—Blood-culture, sputum-culture, and culture of pus from 2 separate subcutaneous abscesses all gave a pure growth of a coagulase-positive *Staphylococcus aureus*, resistant to penicillin, but sensitive to erythromycin and oxytetracycline (terramycin). White-cell count, 16,500 per c.mm. (80% polymorphs). Serum-bilirubin 3·5 mg. per 100 ml. Chest radiograph, "patchy pneumonic consolidation both mid-zones and in the right lower zone."

On April 30 penicillin and streptomycin were discontinued and erythromycin was begun by mouth (500 mg. 6-hourly). Next day he was expectorating foul bloodstained sputum and there were râles in both axillæ. A pericardial rub was audible at the cardiac apex and an electrocardiogram (E.C.G.) (fig. 1*a*) showed the typical T_2 pattern of pericarditis.

On May 6 he was orthopnœic, with striking pulsus paradoxus, increase of cardiac dullness to 1 in. to the right of the sternum, and poor quality, rapid heart sounds. A radiograph showed a large pericardial effusion and lung abscesses in the right middle zone and in the left upper lobe (fig. 2*a*).

Pericardial aspiration yielded 300 ml. of turbid yellow fluid; on culture this produced a pure growth of *Staph. aureus*, resistant to penicillin and sensitive to erythromycin, chlortetracycline (aureomycin), and oxytetracycline. Altogether, pericardial aspiration was performed nine times during the succeeding four weeks and staphylococci were grown on each occasion except the last (May 31).

On three occasions 200 mg. chlortetracycline was injected into the pericardial sac. During this period the patient's

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general condition gradually improved. Early in June, however, when the heart size had become normal and aspiration impossible, he deteriorated again. Sacral œdema and ascites developed and his liver enlarged again to the umbilicus. The jugular venous pressure was not raised and there were no basal crepitations. Hb 100% (16 g. per 100 ml.) and serum-proteins 7 g. per 100 ml. It was considered that constrictive pericarditis was developing at the orifice of the inferior vena cava and possibly also over the right ventricle. As he was allergic to mersalyl, acetazolamide ('Diamox') 250 mg. daily was given with a salt-restricted diet. He gradually improved again after a stormy three weeks, and improvement continued slowly until he became fit for discharge on Aug. 12.

Since then fluoroscopy has demonstrated repeatedly that there is virtually no pulsation of the right border of the heart and that pulsation over the left border of the heart is diminished. On Sept. 20, 1955, a radiograph (fig. 2*b*) showed the heart to be of normal size. Kymograms (fig. 2*c*) confirmed the almost complete absence of visible pulsation over the right cardiac border. E.C.G.s (figs. 1*b* and *c*) showed negative T_1, T_2, T_3, T_{AVF}, T_{V_4}, T_{V_6}.

On Oct. 10, the results of cardiac catheterisation were within normal limits.

The patient has since remained well and is now at work as a clerk. He is having no treatment.

Discussion

Staphylococcal septicæmia, with or without pericarditis, is usually acute and fulminating and before the advent of antibiotics it was invariably fatal. Drainage of the pericardium offered the only hope. Shipley and Winslow (1935) stated that "when the pericarditis is an expression of a generalised septic process the field for successful operative intervention seems to be small. On the other hand, practically all patients not operated on or treated by aspiration die." With the introduction of antibiotics many cures were reported (Bathurst and Ainsworth 1945, Smith and McHugh 1945, Wise and Shaffer 1945), but since 1949 antibiotic resistance has made staphylococcal infections more difficult to eradicate.

In this patient the infecting organism was penicillin-resistant, and erythromycin was used because it is the antibiotic of choice in severe penicillin-resistant infection with pyogenic staphylococci (Martin 1953).

The natural history of healing pyopericardium and its relation to chronic constrictive pericarditis is still uncertain. It is widely held that septic pericarditis may give rise in healing to constrictive pericarditis, but the evidence is far from conclusive. Paul Wood (1950) states that "it is generally believed that recovery may be followed by constriction but the point is still perhaps uncertain." Pickering (1948) has been unable to find any case-report in which a proved septic pericarditis developed constrictive pericarditis in the healed or healing phase. Burwell and Flickinger (1935) described a 17-year-old negro, with a two-week history of fever and dyspnœa, who presented with tachycardia, venous congestion,

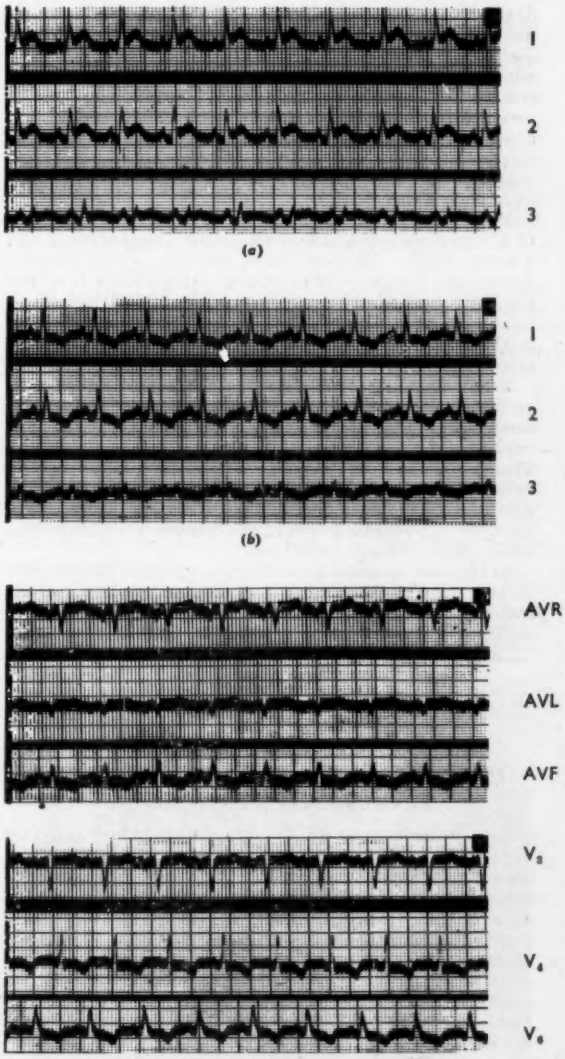

Fig. 1—(*a*) Typical T_2 pattern of pericarditis during acute illness; (*b*) and (*c*) E.E.G.s after recovery, showing negative T_1, T_2, T_3, T_{AVF}, T_{V_4}, and T_{V_6}.

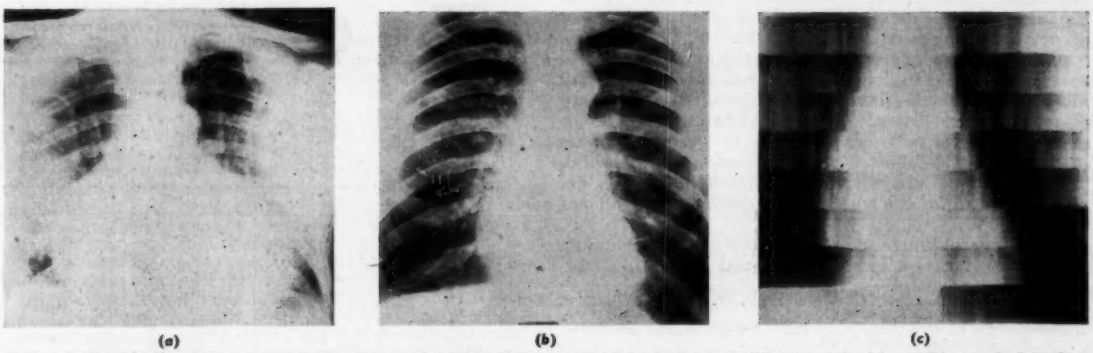

Fig. 2—(*a*) Large pericardial effusion and lung abscesses in right middle zone and left upper lobe; (*b*) normal-sized heart 4½ months later but with (*c*) hardly any pulsation of right cardiac border.

dyspnœa, ascites, and bilateral effusions, and in whom fluoroscopy showed a poorly pulsating heart; operation disclosed a pericardium 7 mm. thick containing pus from which *Staph. aureus* was grown. Pickering (1948) remarked that this was not strictly chronic constrictive pericarditis, but rather a septic pericarditis in the late acute or subacute phase. The clinical picture and the thickness of the pericardium surely suggest, however, that chronic constrictive pericarditis might well ensue from such a case.

More recently, Chambliss et al. (1951) believed that out of 61 cases operated on for constrictive pericarditis, 2 had a septic origin; their evidence, however, is very slender. Evans and Jackson (1952) stated categorically that the condition was caused by tuberculosis only. I have been unable to find a single case of constrictive pericarditis in the literature up to November, 1956, in which a septic origin was proved.

Froment et al. (1955) reported 5 cases of septic pericarditis and discussed the natural history. Their most interesting case was a true chronic constrictive pericarditis observed for five years and relieved by operation. The gross and histological appearances showed no evidence of tuberculosis. Five years earlier the patient's symptoms had been preceded by a typical acute osteomyelitis. The septic origin of the constrictive pericarditis seems likely, though unproven.

In the case recorded here, there is unequivocal evidence of the staphylococcal origin of the pericarditis, of the reduced cardiac pulsation at a time when no fluid was obtainable or demonstrable, and of an episode of obstruction to venous return caused by pericardial constriction. That constriction has not recurred means that this case cannot be classed as one of constrictive pericarditis, but further constriction may develop.

Summary

Pericarditis developed in a patient with penicillin-resistant staphylococcal septicæmia. He was cured by oral erythromycin, pericardial aspiration, and intrapericardial chlortetracycline (aureomycin). A subsequent episode was attributed to temporary constrictive pericarditis following healing. The relationship between septic pericarditis and constrictive pericarditis is still uncertain.

My thanks are due to Dr. H. Alstead, deputy physician-superintendent of Walton Hospital, Liverpool, under whose care the patient was admitted, for permission to publish this case.

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Preliminary Communications

EFFECT OF AN AMINE-OXIDASE INHIBITOR ON ARTERIAL AMMONIUM LEVELS IN LIVER DISEASE

THE main sources of the blood-ammonium are said to be the gut, where bacteria form ammonia from nitrogenous substances, and the kidney.[1] It also seemed possible that some of the blood-ammonium might be derived from amines through the activity of the widely distributed enzyme, amine oxidase. If this were so, then administration of an amine-oxidase inhibitor might be expected to lower the blood-ammonium, and this effect might be more easily recognised in subjects with a raised blood-ammonium. Patients with liver-disease, in whom the blood-ammonium is often increased,[2 3] were therefore investigated. The powerful amine-oxidase inhibitor, iproniazid [4] (isopropyl isonicotinic acid hydrazide, 'Marsilid'), was given intravenously in a dose of 5–10 mg. per kg. body-weight, to 17 patients with liver disease (see table). The fasting arterial-ammonium level cited is the mean of two determinations taken thirty minutes apart, the differences being less than 0·2 μg. per ml. 8 patients had a raised fasting arterial-ammonium level (>1 μg. per ml.) and in all there was a significant fall after the iproniazid sixty minutes ($p<0.02$) and ninety minutes ($p<0.01$) later. 9 patients had a normal arterial-ammonium level (<1 μg. per ml.); in 5 administration of iproniazid was followed by a fall, and in 4 the arterial-ammonium level did not change more than 0·1 μg. per ml. The mean for the whole group showed no significant change.

These observations suggest that some of the ammonium responsible for the increased arterial levels in liver-disease is derived from amine degradation. The site of this action remains obscure. Cardiac, hepatic-vein, and renal-vein catheterisation studies have failed to incriminate the lungs, liver, or kidneys as the main site of this ammonia formation (these results will be published in detail elsewhere). This is not surprising, for amine oxidase is widely distributed in vessel walls,[5] and the inhibitory effect is probably general and not confined to any particular organ. Amine oxidase is not present in blood, and the addition of iproniazid to blood in vitro did not alter the blood-ammonium value.

Some of the changes in hepatic coma have been attributed to ammonium toxicity. When this investigation was planned, it was thought that iproniazid, by reducing the blood-ammonium level, might prove useful in treating

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EFFECT OF IPRONIAZID (5–10 MG. PER KG. BODY-WEIGHT INTRAVENOUSLY) ON ARTERIAL-AMMONIUM LEVELS IN LIVER DISEASE

Patient	Arterial ammonium (μg. per ml.)		
	Time after iproniazid (min.)		
	0	60	90
1	3·8	3·3	2·7
2	2·3	1·8	2·1
3	2·0	2·0	0·8
4	1·7	1·0	1·0
5	1·2	0·5	0·5
6	1·2	0·8	0·6
7	1·2	0·6	0·4
8	1·0	0·5	0·4
Mean	1·8	1·3	1·1
9	0·9	0·6	0·6
10	0·9	0·8	0·8
11	0·8	0·7	0·7
12	0·8	0·6	0·4
13	0·8	0·4	0·5
14	0·7	0·4	0·6
15	0·7	0·7	0·7
16	0·6	0·4	0·4
17	0·4	0·5	0·4
Mean	0·7	0·6	0·6

hepatic coma. But 1 patient deteriorated into coma on continuous iproniazid therapy. In another patient, an electro-encephalogram was recorded continuously after administration of iproniazid. Initially, the tracing showed the features of impending hepatic coma,[6] and this was unaltered by the drug, though the arterial-ammonium level fell from 3·8 to 2·7 μg. per ml. At present iproniazid should not be used in the treatment of hepatic coma. Circulatory amines may be more toxic to the brain than ammonium, or deterioration may be due to the other unknown metabolic effects of iproniazid.

We wish to thank Roche Products Ltd. for advice and generous supplies of 'Marsilid,' and the Medical Research Council for financial support.

Department of Medicine, Postgraduate Medical School, London, W.12

A. M. DAWSON M.B. Lond., M.R.C.P.
SHEILA SHERLOCK M.D. Edin., F.R.C.P.

SOMATIC SEGREGATION OF "INAGGLUTINABLE" ERYTHROCYTES

WHEN human blood is treated with an appropriate antiserum (e.g., group-A blood with anti-A antiserum) most of the red cells are agglutinated. There remains, however, a small proportion of residual cells which do not agglutinate, even after repeated treatment with an avid antiserum. The precise nature of these "inagglutinable" residual cells does not seem to have been investigated.

I wish to report the results of three preliminary experiments which I have performed on "inagglutinable" human red cells:

(1) In group-AB blood, most of the cells which are inagglutinable after repeated treatment with a high-titre anti-A antiserum can readily be agglutinated with anti-B antiserum.

(2) The A receptors on the cells do not seem to be blocked by incomplete antibody. Neither Coombs anti-globulin reagent nor albumin agglutinates these "inagglutinable" cells.

(3) Manipulation of agglutinated red cells does not deprive them of their receptors. A fivefold increase of mechanical agitation during the first stage of the Ashby technique does not increase the number of residual cells.

These findings are compatible with the occurrence of somatic segregation [1 2] in heterozygous AB cells with the production of clones of B cells. Further experiments, which I have so far been unable to perform, are needed to show to what extent, if any, somatic segregation is the explanation for "inagglutinable" erythrocytes.

It must be shown that:

(*a*) In group-AB blood most of the cells inagglutinable after repeated treatment with high-titre anti-B antiserum are readily agglutinable with anti-A antiserum.

(*b*) Homozygous individuals (AA or BB) have far fewer residual cells than heterozygous (AO, AB, or BO) individuals.

(*c*) The distribution of residual cell counts on a series of heterozygous individuals shows wild fluctuations from the mean as a result of the variation in the stage of embryonic development at which somatic segregation occurred.

(*d*) In a series of group-A_1B subjects there is a positive correlation between the residual cell counts after treating separate portions of each individual's blood with anti-A and anti-B antisera. With perfect antisera the expectation is that the two residual types should appear in equal proportion in any one individual.

I submit these preliminary observations in the hope that they may be of interest to workers in the field of immunohæmatology who have at hand individuals of known genotype and adequate supplies of appropriate antisera.

Pathology Department, Western Infirmary, Glasgow

ROBERT B. GOUDIE M.B. Glasg., M.R.C.P.

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New Inventions

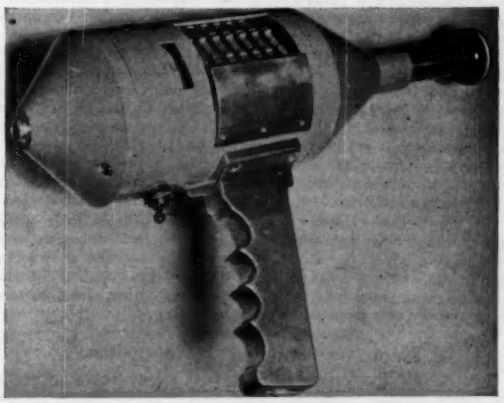
A HAND TINTOMETER FOR RADIOLOGICAL AND DERMATOLOGICAL WORK*

IN radiological work it is often desirable to measure and record radiation reactions of the skin. In the past the lack of an exact method of measurement has greatly hindered investigations in this field. In dermatology the need of quantitative evaluation of colour changes has long been felt. Photometric methods have been tried but are unsatisfactory in that they do not record tone or hue but only intensity of light. The instrument here illustrated was developed in collaboration with Messrs. G. J. Chamberlin and F. J. Heath, Lovibond Tintometer Ltd., Salisbury, to whom we are indebted.

In viewing, a circular split field is seen, one segment being the sample under examination and the other a standard white surface, both being illuminated equally with three electric bulbs inside the instrument. By means of rotatable discs a graded series of 'Lovibond Glass Standards,' coloured red, yellow, and blue, can be interposed between the source of illumination and the white surface, the combination being adjusted until the two segments are matched in tone and intensity. The values of the sample are defined in terms of the amount of each of the three filters required for colour match. Provision is also made for insertion of neutral tints over the sample, if this is excessively bright.

Practice is required to use the instrument to the best advantage, and it is advisable always to use it under the same conditions of room lighting. As colour is a subjective sensation, the same person should make all the measurements in one series of experiments.

The advantages of the method are as follows: (1) the original tint can be reconstructed at any time, enabling comparison to be made with other samples or with the same sample at a later date; (2) it is possible to convert



the Lovibond values to international units; and (3) the Lovibond units being known and accepted in most countries, the significance of the values recorded at any centre is not so restricted as would be the case with other methods.

The instrument has been in use in the department of radiotherapy in this hospital for more than three years and has proved very useful in radiobiological and dermatological work and as a research tool.

In plastic surgery it has proved to be a boon as it dispenses with the need for repeated attendances for colour matching of patients for whom prostheses (artificial noses or ears) are prepared.

B. JOLLES M.D. Florence, D.M.R.
R. G. MITCHELL B.SC. Edin.

General Hospital, Northampton

* The instrument was exhibited at the Eighth International Congress of Radiology in Mexico City (July, 1956).

Medical Societies

BRITISH ORTHOPÆDIC ASSOCIATION

THE Robert Jones centenary meeting of the association was held at Shrewsbury and Oswestry on May 9–11, under the presidency of Mr. PHILIP WILES.

Spinal Fusion for Scoliosis

Mr. I. W. WINCHESTER (Oswestry) had reviewed the results in 66 cases considered suitable for fusion in the past twenty years at Oswestry—7% of the patients seen with scoliosis. Fusion was done to diminish final deformity or hold correction, to stabilise the spine, and to prevent pain. The Risser jacket had now been abandoned for the Abbott method. After fusion, patients spent three to six months lying and a further six months ambulatory in a jacket. 11 cases followed for less that two years were excluded; of the remainder, 33 were idiopathic, 11 congenital, and 11 paralytic. 80% had relapsed, including almost all those where some previous correction of the curve had been obtained. As a proportion of the original curve, the average original correction was 38%, the final maintained correction 14%. Mr. Winchester accounted for this relapse-rate under four headings: (1) inaccurate measurements; (2) failure to produce adequate compensatory curves (the danger of over-compensation was probably theoretical only); (3) subsequent growth, associated with failure to extend the fusion into the compensatory curves; and (4) development of pseudarthroses, although none were detected in this series. He concluded that correction of rotation was a vital factor in preventing relapse, and that the object of plaster correction was to increase the compensatory curves rather than to correct the primary curve.

Posterior Dislocation of the Shoulder

Mr. W. GISSANE (Birmingham) said that Astley Cooper had described posterior dislocation as easily diagnosed, but in fact it was rare and the diagnosis often missed. Fractures of the humeral head (either a coronal split or a "pond" fracture), from contact with the posterior rim of the glenoid, were common and produced harsh crepitus. Dissection and operation had shown that the glenoid labrum remained intact, the capsule being torn close to it. The dislocation was due to an internal rotation force; the posterior glenoid margin might also be fractured. Subscapularis remained intact. The lesion had been explored through a posterior incision, splitting the posterior third of the deltoid and dividing infraspinatus. Fractures of the head had been wired, the wire lying under the articular cartilage, and the dislocation reduced by external rotation of the arm. The patient could return to work in three months, though full movement might take a further year to recover.

Sir REGINALD WATSON-JONES said that the essential point of reduction was external rotation and that the arm must be splinted for three weeks in external rotation to prevent recurrence. Mr. GISSANE denied that fixation in external rotation was necessary after open reduction and repair; the shoulder was perfectly stable in a sling.

Epiphyseal Stapling in Knock-knee

Mr. A. E. PRITCHARD (Liverpool) spoke on stapling of the lower femoral epiphysis in idiopathic knock-knee. He had studied 26 patients treated by Mr. Robert Roaf at Liverpool and by the surgeons of the Robert Jones and Agnes Hunt Orthopædic Hospital. Conservative treatment had failed to benefit these children, who were all 8 years of age or more and almost all overweight. He maintained that surgery was occasionally indicated in this type of patient, and believed that epiphyseal stapling was superior to supracondylar osteotomy because: (1) the cosmetic result was better; (2) the period in hospital was shorter; and (3) nursing was much easier. He described the technique and emphasised that no stripping of periosteum was necessary, and that it was probably unnecessary to staple the upper tibial epiphysis as well. Three staples must be used, and should be left in place until there was slight bow-leg. It was impossible to predict the time required for correction in each individual: this varied from five to twenty-one months. The results were excellent in 24; 2 relapsed. 1 child was left with some loss of knee movement. After removal of staples there was a sudden growth-spurt followed by normal epiphyseal growth. In no instance had this failed to follow. Tribute was paid to Dr. Walter Blount, who had pioneered the procedure.

Sir REGINALD WATSON-JONES said that in the past twenty years he had never found it necessary to operate for knock-knee. Correction always took place within one to three years if Robert Jones's principle was followed; shoes with inner wedges on the crooked heel and sole must be worn constantly—even to the bathroom.

Mr. W. SAYLE-CREER (Salford) denied that wedges always cured knock-knee, and thought that the use of a night splint was essential. Stapling operations were liable to leave swollen knees with ugly scars, and he preferred a supracondylar osteotomy when necessary.

Mr. ROBERT ROAF (Oswestry) said that all the cases discussed by Mr. Pritchard had been deteriorating despite conservative treatment. There was no difficulty in removing the staples as long as they were not buried under the periosteum. He now rarely felt it necessary to staple the tibia also.

Mr. H. OSMOND-CLARKE thought that splints were useless and inflicted psychological trauma on the child. His experience led him to use staples less and less in this condition.

Immunity Factors in Bone Homografts

Mr. J. CHALMERS reported experiments undertaken to see whether bone homografts participate in a tissue-immunity reaction. Bone homografts to a muscle site in rats gave rise to an early phase of new bone formation which was arrested at ten days; the new bone later died. After several weeks, a second phase of new bone growth appeared in relation to the graft. If the rat had been immunised by a skin-graft from the same donor, there was no early phase of new bone growth. If the homograft had been killed by freeze-drying, the early phase did not occur, but the second phase did in a few instances. It was concluded that the early phase arose from osteogenic cells carried over with the graft, which became the victim of an immune response by the host. The second phase was due to metaplastic induction in the host connective-tissue cells.

Further evidence was provided by experiments in which skin homografts were carried out in animals which had been previously grafted by fresh bone homografts from the same donors. The skin grafts were rejected early (at six days). When the bone homograft had previously been treated by freeze-drying, subsequent skin homografts survived the normal span of eleven days. This showed that bone contained tissue-antigens, and that both bone and skin had antigens in common. These antigens were inactivated by freeze-drying.

Bone-bank homograft was unlikely to prove inferior clinically to fresh homograft, for neither could contribute living cells. As dead graft did not stimulate immunity, some other process than a tissue-immunity reaction must be responsible for the differences in behaviour between bank homograft and fresh autograft.

Dr. PAUL CURTISS (Cleveland) held that, since no circulating antibody active against a homograft had been identified, immunisation was not yet proven.

Atlanto-axial Dislocation in Spondylitis

Mr. D. W. PURSER and Dr. J. SHARP (Manchester) said that, although it was very rarely reported in the literature, they had seen 40 cases of spontaneous atlanto-axial dislocation—17 in ankylosing spondylitis and 23 in rheumatoid arthritis. Tetraplegia might follow. The diagnosis depended on flexion-extension radiographs, the lateral view revealing the forward shift as well as the angulation of the atlas on flexion which was associated with rupture of the transverse ligament. In ankylosing spondylitis it was usually seen in long-standing (and often still active) cases, many with severe spinal-flexion deformity and some with signs of cord involvement. The head was tilted forwards with flattening of the angle between neck and occiput. Pain made worse by coughing was a common symptom. Radiotherapy gave no relief. The onset of neurological symptoms might be very sudden, and the presence of lesions in the lower cervical spine might complicate the diagnostic problem. Reduction and fixation by bone-grafting from occiput to axis usually led to almost complete recovery. Some patients stabilised spontaneously. In rheumatoid arthritis a painful click was often present on movement, but neurological involvement was much less common. Nerve lesions or severe pain were held to be an absolute indication for operation. Reduction was attained, and maintained during operation, by traction with skull-callipers

inserted further forwards than usual. Three weeks after operation, plaster was applied, embodying the skull callipers, and maintained until union was sound.

Mr. J. H. ANNAN (Huddersfield) demonstrated radiographs of a similar case with gross displacement when the patient was erect but which reduced spontaneously in dorsal decubitus.

Non-union of Humeral Condyle

Mr. C. C. JEFFERY (Exeter) said that of 13 cases of non-union of the lateral condyle of the humerus, 10 had resulted from minor displacements and 3 had followed open reduction and soft-tissue suture of major displacements. Some cases of initially slight displacement progressed to non-union with increasing deformity, grossly distorted elbows, and sometimes delayed ulnar palsy.

Open reductions should be stabilised by internal fixation with a stainless-steel screw to maintain exact reposition; imperfect closed reductions should be critically assessed with a bias towards open reduction and screwing; union must be established unequivocally by radiographs; and where union was delayed, or where non-union was established without significant displacement, a hole should be drilled through the portion of diaphysis which had separated along with the displaced epiphysis and on into the humeral diaphysis. The resulting cavity was packed with iliac cancellous bone. This operation had resulted in bony union, minimising deformity, in the 3 cases of non-union which arose under supervision.

Poliomyelitis Vaccination

Prof. C. H. STUART-HARRIS (Sheffield) said that some people had argued against any preliminary clinical trial of poliomyelitis vaccine, by analogy with the history of diphtheria immunisation, and on the grounds that proof of the vaccine's antigenicity in monkeys was sufficient evidence of its being beneficial, that large-scale experiment on children was morally unjustifiable, and that in any case the American trial would soon produce the evidence required. But after the disaster in the United States the British vaccine was modified and the American results were no longer applicable. Therefore the British vaccine was introduced in such a way that its effect could be measured. An appeal for volunteers yielded 30% of the 6,000,000 children aged 1–9 years. The fact that the vaccine was so scarce enabled controls, as far as possible free from bias, to be obtained from volunteers who could not be inoculated; the giving of an inert inoculation to this group—the ideal method—was not practicable.

All cases of poliomyelitis, both paralytic and non-paralytic, notified within the ages 1–9 were reported to the M.R.C. statistical unit, and for all registered children among them clinical reports were requested three weeks and three to five months later. These reports did not answer the question whether inoculation influenced infection by the virus (i.e., reduced its ability to infect the gut)—a matter to be settled only by laboratory tests. Type-1 virus was found in more than 80% of cases, thus providing an adequate field test of the effectiveness of the type-1 strain used in the British vaccine. The incidence of immediate local reaction was very low, because of the small protein content, and sensitisation to antibiotics was very unlikely. Immunisation to monkey protein was possible, but tests for antibodies arising from the presence of Rh antigen and for nephritis from monkey-kidney material had all proved negative. The exclusion of live virus by stringent safety tests would prevent direct infection; the possibility that latent poliomyelitis in the child might be provoked by the injection was under consideration.

Dr. W. L. M. PERRY said that the virus was incubated in a medium containing a tissue-culture of monkey renal cortical cells; after filtration, the resulting suspension of living virus was treated with formalin for fourteen days.

In the United States disaster with the Cutter vaccine, virus was isolated from about half of the 200 cases of poliomyelitis, and of these isolations all but one were of the type-1 Mahoney strain. The presence of living virus in the offending batches of vaccine could be demonstrated easily only in tests on cortisone-treated monkeys, most of the tests in tissue-cultures of renal cells proving negative. The monkey tests demonstrated the presence in the vaccine of living virus of all three types. This discrepancy had never been explained, and was the main reason for the rejection of the Mahoney strain of type 1 for use in the British vaccine. In Britain, tests were made both by the makers and by the M.R.C. In each laboratory nearly 2 litres from each batch was cultured and subcultured over a five-week period, and tests were also carried out by intracerebral, intraspinal, and intramuscular injection in both rhesus and cynomolgus monkeys, the latter being more sensitive than the former. Tests for antigenicity were made in monkeys after three injections at weekly intervals, the serum-antibody content being estimated by its capacity to neutralise living virus added to tissue-cultures.

Prof. G. W. A. DICK (Belfast) emphasised that type-1 virus was responsible for most cases of paralysis. The antibodies produced by each type were specific. The object of work with live viruses had been to reproduce the immunity associated with natural infections, with the added advantage that the vaccine could be taken by mouth.

An attenuated type-II virus strain (originally used by Koprowski) was considered suitable because it never produced paralysis when inoculated intracerebrally in monkeys and was non-cytopathogenic. It was tried in 190 children, and type-II antibodies developed in 77%. Unfortunately it was found that the virus was excreted by all subjects who developed antibody. Furthermore, the excreted virus was cytopathogenic, and caused paralysis in inoculated monkeys. Because of the potential danger of this strain further study of it was abandoned. Experience with a type-1 (SM) strain was similar.

There was at present no evidence that three injections of a good Salk-type vaccine produced an immunity inferior to that produced by attenuated strains, and one line of future research should be directed towards developing a purified dead-virus preparation of high antigenicity rather than towards the present types of live-virus vaccines.

Calcinosis Circumscripta

Dr. R. W. BAILEY (Los Angeles) divided calcinosis into two groups; (1) calcinosis circumscripta, usually seen in women and associated with scleroderma, sclerodactyly, and Raynaud's syndrome; and (2) calcinosis universalis, often an affection of children. Abnormal calcium and phosphorus metabolism, local failure of circulation, and some endocrine upset associated with the menopause had all been considered in the ætiology, but without clear-cut evidence. He reported a case in a woman of 63, whose hands and elbows were chiefly affected. She was in slightly positive calcium-balance; phosphatase and other laboratory studies were normal. Biopsy showed that fascial planes and muscles were affected, with intramuscular collagenous degeneration and thinning of the overlying skin. He had tried the effect of sodium edetate ('Versene') in this patient in the hope that it might bind with the calcium in the deposits and help disrupt them. Although calcium output in the urine was increased, there was no clinical change, nor reduction in the calcium percentage in the ashed deposits. The drug caused auricular fibrillation, which ceased on its withdrawal. He concluded that calcinosis was not a general metabolic disease but a local change. There was no evidence of preferential removal of calcium from the deposits. He postulated that in these cases something was lost from the cells which normally protected them from calcification and thought that future work should aim at further understanding of histochemistry and cell metabolism.

Mr. H. J. SEDDON commented that similar calcification was seen in Volkmann's ischæmic contracture.

Idiopathic Pes Cavus

Mr. J. N. ASTON had reviewed 755 cases of idiopathic pes cavus from hospital records. The information thus obtained was limited, and there was a bias in favour of the severer case, whatever aspect was considered.

Pes cavus did not often present under the age of 5 years, reached a peak between 9 and 13, and then fell off again. Males were affected more often earlier, and (in the young) more severely, than females. This early male preponderance was not seen in the progressive cases, which did not seem to present any younger than the average.

Those with varus of the heel did badly, those with valgus did well. Clawing was the commonest individual feature, and those with either clawing or dropping of the 1st metatarsal head did not do as well as those in whom it was not severe. Forefoot varus and asymmetry between the feet seemed to make no difference to the outcome.

Some relationship seemed probable between pes cavus and spina bifida occulta. A laminar defect was found in 52 of 104 cases radiographed, against about 18% in normal people; it did not seem to be associated with a bad prognosis.

Reviews of Books

Essentials of Fluid Balance

D. A. K. BLACK, M.D., F.R.C.P., reader in medicine, University of Manchester. Oxford: Blackwell Scientific Publications. 1957. Pp. 127. 18*s*. 6*d*.

IN less than 100 pages, Dr. Black has summarised present knowledge of fluid balance, covering the metabolism of water, sodium, and potassium, and the acid-base balance. In a short appendix he discusses some special problems. This is concentrated fare, but it demonstrates well how knowledge gained from physiology, medicine, surgery, and therapeutics can be drawn together into an easily comprehensible story. No amount of writing can encompass all the clinical problems; and attempts to do so have often been tedious and sometimes misleading. This book provides the essential information on which to base decisions about particular problems. It should prevent many misconceptions: the serious student will enjoy it, and the clinician may well turn to it for help when some larger work has failed him.

Dr. Black brings out the limitations of treatment, where knowledge is still wanting. He does not believe in rule-of-thumb methods, for here, perhaps even more than in other subjects, treatment is a matter of understanding and not of dogma; but in a final short chapter, aptly headed "an approach to treatment," he gives some guidance on how to apply what is known. Some readers might have liked to see an example of a workable chart for the day-to-day records on which treatment should be based; but, as is his custom, Dr. Black indicates where the information may easily be found; and many people may prefer to devise a chart of their own.

The style is concise, forceful, and often witty. An occasional ambiguity interrupts the reader's progress in the earlier parts of the book; on the other hand, when he comes to the chapter on potassium he is treated to a masterly presentation. There is an up-to-date source of selected references, and the delay between writing and publication has been remarkably short. Both students and teachers will be attracted and rewarded by Dr. Black's skilful handling of his subject.

Connaissance élémentaire du rhumatisme

S. DE SEZE and M. MAITRE. Paris: Expansion Scientifique Française. 1957. Pp. 273. 2800 francs.

THIS lively and attractive introduction to the rheumatic disorders has been written by Professor de Seze (with the aid of M. Maurice Maitre's lucid diagrams) primarily to instruct nurses, physiotherapists, and occupational therapists. There is, however, sufficient detail to make it a useful introduction for students and doctors, who would find the many excellently reproduced radiographs and clinical photographs particularly helpful. In the section on treatment the emphasis is often different from that usual in this country. Thus, sex hormones are given an important place in the treatment of degenerative joint disease, and in rheumatoid arthritis cortisone and its relations are dealt with first and at length, overshadowing the subsequent description of the basic regimen of rest, splinting, and exercises.

Surgeon's Journey

J. JOHNSTON ABRAHAM. London: Heinemann. 1957. Pp. 441. 25*s*.

IF any book called loudly for a sequel it was Mr. Johnston Abraham's *The Surgeon's Log*, published in 1911, now in its 30th edition, and translated into several tongues. This new book tells of his life before and since the casual voyage which gave him quite unexpected fame and our language one of the best of travel books.

A boyhood in County Londonderry was followed by professional education at Trinity College, Dublin, in the palmy days of Mahaffy et al. He reached consulting practice in London by the haphazard and strenuous route usually followed in those days. Between 1914 and 1918 he served first in the Serbian army and then in our own in Egypt and Palestine. Few accounts of the medical services in war are at once so readable and so instructive. In the years which followed the war it was his delight to write of his profession. Though the laity favour the gripping works of "James Harpole," it is his life of Lettsom which has pleased the author most and given him his considerable repute as a medical historian. As a publisher he has done his best to help other medical authors. But with all these distractions his life has centred on his surgical practice and his hospitals, the Princess Beatrice and the Lock, whose obituary notice he writes with candour and charity.

This is the urbane story of a man who has seen the best of life in London, social and professional, and enjoyed every minute of it. In his native Coleraine they will be saying, no doubt, that Jamie Abraham is a great crack and a sound medical doctor forbye—and so he is.

Left-handedness

Laterality Characteristics and their Educational Implications. MARGARET M. CLARK, M.A., PH.D., the Scottish Council for Research in Education. London: University of London Press. 1957. Pp. 212. 15*s*.

THIS is an excellent account of a fundamental educational problem—the detection and training of left-handed children. Dr. Clark gives a brief, but just, review of the literature, a clear picture of the tests for dominant laterality, and a description of her own research. Her book will be useful to teachers, educational psychologists, and school medical officers. Any doctor who is in the habit of diagnosing "crossed-laterality" as a cause of clinical symptoms should read the book—and he will receive a salutary shock.

The Bright Countenance

A Personal Biography of Walter Morley Fletcher. MAISIE FLETCHER. London: Hodder & Stoughton. 1957. Pp. 351. 25*s*.

THIS biography began as a family record. Written by Lady Fletcher, it was originally intended for Sir Walter's grandchildren; and, though it has now been made available to the public, the family intimacy of the writing has been retained. The text includes long extracts from his letters and other writings on many subjects.

The book begins with a delightful short biographical foreword by the late M. R. James and ends with a 40-page supplement in which Sir Arthur MacNalty describes Fletcher's contributions to physiology and his work for the Medical Research Committee and later for the Medical Research Council. A great deal was achieved by these bodies under his wise guidance; but, as Sir Arthur points out, a whole volume would be needed to record the extraordinary progress of those eventful years.

Textbook of Orthopædic Medicine (3rd ed. Vol. I. *Diagnosis of Soft Tissue Lesions*. London: Cassell. 1957. Pp. 711. 45*s*.).—Anyone who practises orthopædics soon discovers that many of his patients suffer from maladies which are not illustrated in any museum of pathology. Their radiographs are normal, their laboratory investigations negative—and their treatment correspondingly difficult. Dr. James Cyriax has provided a guide to this dark hinterland in surgery. From its pages the practitioner may learn to diagnose with confidence such conditions as "tennis-elbow"—and even to distinguish between at least four distinct varieties of the disease. Far from being nonplussed when confronted by a case of acute sciatica, he can now choose his treatment from more than forty thoughtful pages on its management. Dr. Cyriax is convincing and interesting on such debatable topics, but his excursions into the more familiar field of surgical orthopædics are less successful, and here clarity is sometimes sacrificed to brevity. We are sorry to see that Georg Clemens Perthes is again poorly remembered in "Perthé's disease," though Dr. Cyriax is by no means the first to add the accent and the apostrophe. The volume is clearly based on long and careful thought, and all who undertake to relieve the painful and common conditions Dr. Cyriax describes will be glad to have his advice to hand.

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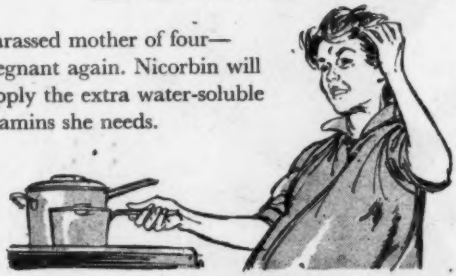

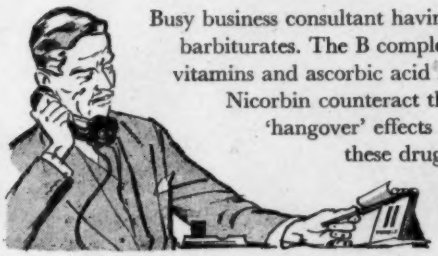

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THE LANCET

LONDON: SATURDAY, JUNE 29, 1957

Cigarettes

"We are constantly deluded by language. We say a person dies of a cancer . . . The truth must be that a person dies of the causes of cancer; and the cancer is not the cause, but the mode of dying."—WILLIAM LAMBE, 1815.[1]

THE evidence that heavy cigarette-smoking causes cancer and hence death has become increasingly difficult to ignore. The Medical Research Council's statement set out on p. 1345 summarises the facts clearly and concisely, and concludes with the important statement that "In the opinion of the Council, the most reasonable interpretation of this evidence is that the relationship is one of direct cause and effect." This conclusion accords with the view of most who are familiar with the mass of detailed evidence accumulated in the past seven years, not least through the careful and convincing studies of Prof. A. BRADFORD HILL, F.R.S., and Dr. RICHARD DOLL. The unhurried verdict of an impartial scientific body such as the M.R.C. cannot but command respect and must make every thoughtful person reconsider the criticisms by the Tobacco Manufacturers' Standing Committee.[2] This committee discounts the suggestion of cause and effect because it derives from observations rather than from strictly controlled human experimentation on randomly selected population groups and because, so far, no very convincing support has come from the laboratory. The limitations of observational data have long been well known to epidemiologists; but should SNOW have waited for the discovery of the cholera vibrio before persuading Londoners not to drink their own sewage? As the tobacco manufacturers have implied, atmospheric pollution may be a factor in the causation of cancer of the lung; but its incrimination, like the association of genotype and disease, rests equally on observed correlations. In the urgent defence of the public health we should base action on the best evidence currently available.

Whatever the reaction to the evidence we already have, all will agree that more would be welcome. In 1954 the British Tobacco Manufacturers' Association gave £250,000 to the Medical Research Council, of which £69,000 had been spent by the end of last October. This may seem a comparatively small amount for such an important subject. The work of the council is, however, increasing, as its latest annual report, published this week, makes clear. It has provided, with the help of the fund, laboratory facilities and staff (in the University of Exeter) for a new carcinogenic-substances research group and has set up other research groups concerned with atmospheric pollution (at St. Bartholomew's Hospital) and with epidemiological research in respiratory diseases (in the University of Sheffield). In addition, grants have been made to individuals in universities, hospitals, and elsewhere.

It would be unreasonable to expect the people or the Government to take kindly to the idea of reducing cigarette-smoking; for this is both a widespread pleasure and the source of immense State revenue and of an important element in international trade. It may reasonably be argued that the citizen should be free to engage in the pleasures he chooses, provided he does not harm others; but all smokers and potential smokers should at least be aware of the extent of the risk in smoking cigarettes heavily, and this information can be conveyed best (and perhaps only) with the Government's help. Measures aimed at direct control of smoking, even were this desirable, would have little chance of success. No such measure could succeed without the approval of a large majority of the people, and it seems unlikely that approval on this scale would be forthcoming. (Almost to a man, the large smoking public has more than once shrugged off indirect control applied through steep rises in the tax on tobacco.) Yet the responsibility of Government and people, whether smokers or not, cannot end with subsidising research and publicising hazards: it should extend to discouraging young people from taking up the habit of smoking cigarettes. A middle-aged cigarette-smoker with a chronic cough may be moved by the fear of cancer to reduce his smoking or give it up; but we cannot expect a young person to be deterred by a risk that is apparently so remote, and among adolescents smoking seems in fact to be lamentably common.[3 4] Youngsters are unlikely to be influenced so much by lectures, pamphlets, and the advice of adults as by fashion among those to whom they look for an example. Smoking is very much a matter of fashion, and if the large loss of life due to cigarettes is to be reduced the fashion, especially among young people, must be changed. Such a change (as is clear from the article on p. 1348 of this issue) does not necessarily require legislation; and closer study of the social history of tobacco might be rewarding. In any event it is doubtful whether tobacco habits can be changed rapidly so long as the reformer's modest voice has to be pitted against the power of modern advertisements; but organisations, such as the British Broadcasting Corporation, that do not depend on advertising revenue could do much to counter commercial propaganda, and the cinema might shape tobacco habits just as it shapes hair styles. In addition, fuller use should be made of existing legislation: the law against selling tobacco to young people is often administered with the utmost laxity.

It would be unrealistic as well as arrogant to suppose that cigarette-smoking can or should be forbidden: the aim should rather be to influence the heavy smoker to modify his habit. This modification might take two forms: first, replacement of the cigarette by the less dangerous pipe or cigar; and, secondly, reduction in the amount of tobacco

1. Lambe, W. Additional Reports on the Effects of a Peculiar Regimen in Cases of Cancer, Scrofula, Consumption, Asthma, and other Chronic Diseases. London, 1815.
2. Annual report by Tobacco Manufacturers' Standing Committee. See *Lancet*, June 22, 1957, p. 1306.
3. Jones, A. P. *Ibid*, March 23, 1957, p. 631.
4. Raven, R. W. *Ibid*, June 1, 1957, p. 1139; *Roy. Soc. Hlth J.* 1957, 77, 250.

used. The evidence suggests that the temperate cigarette-smoker, who confines himself to, say, one after each meal or to two or three in the evening, runs an appreciably lower risk. Two hundred years ago "drunkenness was the acknowledged national vice of Englishmen of all classes." [5] Today, to drink whisky from a hip-flask in a suburban train on the way to work is socially unacceptable. Maybe to smoke a cigarette at such a time will in due course also be deemed a social impropriety. If so, the community will be the healthier.

The Newborn Infant's Oxygen-supply

THE newborn infant, deprived of the placental circulation, will die unless by his own efforts he can produce and maintain a higher level of oxygenation than prevailed in the later phases of intra-uterine life. The immediate adjustments of post-natal life are directed to this end and are primarily concerned with establishing adequate pulmonary ventilation and ensuring that the brain, rather than the liver, receives the best-oxygenated blood.

The fundamental work of BARCROFT [6] showed that in pre-natal life the fœtus elaborates the central nervous organisation required for breathing, which normally is inhibited until required for pulmonary respiration. Release from inhibition occurs either because of the inflow of new sensory stimuli at birth or by hypoxic depression of the inhibitory centres. ACHESON et al.[7] have extended this work using, like BARCROFT, the sheep. In a study of oxygen consumption in fœtal and newborn sheep they have shown that there exists a remarkable, but limited, capacity to adjust the oxygen need in relation to the supply. In the latter half of pregnancy adequate oxygenation can be maintained only by great increases in umbilical blood-flow. If the placenta is insufficient or the compensatory mechanisms in the fœtus fail, the survival of the fœtus depends entirely on its tolerance to anoxia. That similar mechanisms operate in human pregnancy seems likely from the work of WALKER [8] and RACHEL MACKAY,[9] who have shown a progressive fall in oxygen saturation of the umbilical-cord blood as pregnancy proceeds to term and, especially, beyond. A similar fall is found when pregnancy is complicated by pre-eclamptic toxæmia. Some of the clinical facets of placental insufficiency have been discussed by RANDALL.[10]

Placental circulatory failure with decompensation of the fœtus will cause, in severe cases, intra-uterine death. Lesser degrees of hypoxia may initiate intra-uterine gasping movements which, if associated with meconium-stained liquor amnii, produce asphyxia and meconium pneumonitis. The anoxic infant is born with an inadequate oxygen reserve and a depressed nervous system—two factors which greatly decrease its ability to attain adequate pulmonary ventilation. More acute lowering of fœtal oxygenation is found in cases of abnormal delivery; interruptions of placental blood-flow, as in placenta prævia and prolapsed cord; and interference with the oxygen-supply to the placenta by general or spinal anæsthesia. HENDERSON et al.[11] point out that, while all these factors produce a measurable lowering of umbilical-vein oxygen saturation, this is not necessarily a good guide to the clinical state of the infant. Some infants at birth may survive with extremely low cord-oxygen saturations, whereas others with mildly reduced oxygen saturations are severely asphyxiated. This is to be expected in view of the limited value of a single sampling of cord blood and the many traumatic and chemical factors which influence the first hours of a baby's life.

After birth the majority of infants rapidly attain a near-adult arterial oxygen saturation.[12] SHIELDS and TAYLOR [13] have shown that infants born after complications of pregnancy, heavy maternal analgesia, or operative delivery are considerably slower in achieving a normal saturation, determined by a continuous-recording ear oximeter. Further studies on the lines of those reported by CROSS et al.[14] are needed in order to elucidate the special metabolism of the newborn and its powers of survival in low oxygen levels. Possibly other factors are more important than oxygen saturation in determining the clinical condition of the newborn and the eventual prognosis. One of the other factors is the circulatory status of the newborn. The neonatal circulation plays an important part in producing lung expansion and also ensures preferential oxygenation of the brain. ADAMS and LIND,[15] by cardiac catheterisation, have demonstrated directly the persistence of a patent ductus arteriosus with a predominantly left-to-right shunt in the first few days of life. Dr. GUNTHER [16] has attempted to relate the complicated circulatory adjustments after birth with the changes in blood-volume consequent on occlusion of the cord and the later development of pulmonary syndrome. Early clamping of the cord or elevation of the infant while the cord is still attached to an atonic uterus will deprive the infant of much of his blood-volume. This will be of greatest importance in premature babies, who have a relatively larger proportion of blood in the placenta, and in babies delivered by cæsarean section. It is just these two classes of infants that are susceptible to pulmonary syndrome or, as it is better known, hyaline membrane disease. BROWN [17] has already drawn attention to the possible connection between early clamping of the cord and the onset of hyaline membrane disease. So far, the arguments for this association are largely theoretical. Dr. BONHAM CARTER,[18] summarising recent advances in this field, has ingeniously related the changes immediately after birth with the respiratory difficulties of early neonatal life. It should not be difficult to devise a controlled study to demonstrate this relationship. It is now generally, although not universally, accepted that hyaline membranes are formed from pulmonary exudate, probably as a result of pulmonary congestion or hypertension.[19] Early

5. Trevelyan, G. M. English Social History. London, 1942.
6. Barcroft, J. Researches on Pre-natal Life. Oxford, 1946.
7. Acheson, G. H., Dawes, G. S., Mott, J. C. *J. Physiol.* 1957, **135**, 623.
8. Walker, J. *J. Obstet. Gynæc., Brit. Emp.* 1954, **61**, 162.
9. MacKay, R. B. *Ibid*, 1957, **64**, 185.
10. Randall, C. L. *Amer. J. Obstet. Gynec.* 1957, **73**, 931.
11. Henderson, H., Mosher, R., Bittrich, N. M. *Ibid*, p. 664.
12. Smith, C. A., Kaplan, E. *Amer. J. Dis. Child.* 1942, **64**, 843.
13. Shields, L. V., Taylor, E. S. *Amer. J. Obstet. Gynec.* 1957, **73**, 1011.
14. Cross, K. W., Tizard, J. P. M., Trythall, D. A. H. *Acta pædiat., Stockh.* 1957, **46**, 265.
15. Adams, F. H., Lind, J. *Pediatrics*, 1957, **19**, 431.
16. Gunther, M. *Lancet*, June 22, 1957, p. 1277.
17. Brown, R. J. K. *Ibid*, Jan. 19, 1957, p. 163.
18. Bonham Carter, R. E. *Ibid*, June 22, 1957, p. 1292.
19. Gitlin, D., Craig, J. M. *Pediatrics*, 1956, **17**, 64.

clamping of the cord might well lead to pulmonary hypertension as the rise in systemic blood-pressure consequent on the increased peripheral resistance will be transmitted via the patent ductus arteriosus to the largely unopened pulmonary vessels. It is more difficult to see how the reduced blood-volume consequent upon siphonage would operate. Certainly, expansion of the lungs might be delayed; but the picture of hyaline membrane is one of obstructive dyspnœa, emphysema, and secondary collapse rather than of primary atelectasis. Nor do infants born exsanguinated from acute blood-loss show clinical or pathological evidence of hyaline membrane.

Whatever the truth concerning this hypothesis, it is salutary to review continually the management of the newborn in relation to newly discovered physiological facts. The tragedies of retrolental fibroplasia and of kernicterus of prematurity due to excessive dosage with a vitamin-K analogue are stern reminders that we fail to do so at the infant's peril.

Second Thoughts on Anticoagulant Treatment for Coronary Disease

JUST over a year ago we reviewed current views on the value of anticoagulant treatment in acute coronary disease [1] and drew attention to the conflict of opinion between those who, like GILCHRIST in Edinburgh and IRVING WRIGHT in New York, believed that every patient should be given the benefit of anticoagulant treatment, and those who, like RUSSEK and ZOHMAN, consider that such treatment should be reserved for the "poor risk" patient. The choice between these two views is important because, if the first group are right, it would be logical to send to hospital every patient who is fit to be moved so that anticoagulant treatment can be begun without delay; whereas if the second group are correct it would be best for the "good risk" patients to be kept at home. The burden of the anticoagulant treatment on hospital accommodation and laboratory facilities has already become considerable and coronary thrombosis is now one of the commoner causes for admission to hospital.

The two papers from Oxford by Dr. HONEY and Dr. TRUELOVE which appeared in two of our recent issues [2] bear directly on this problem, since they have examined afresh the question whether anticoagulant treatment does in fact improve the prognosis of acute myocardial infarction, and how far the large expenditure of time, energy, and money on the admission to hospital and the laboratory control of treatment is justified by results. They have made an elaborate analysis of the results of 543 admissions (involving 506 patients) to the Radcliffe Infirmary at Oxford in the years 1940–54. They took an arbitrary time of eight weeks from onset to represent the acute phase, and succeeded in tracing all but 1 of the 348 patients who had survived beyond this phase. The period of the survey spans the introduction of anticoagulant treatment at the hospital in 1948, and since 1951 3 out of every 4 patients have received this treatment. In their series of patients there were twice as many men as women; two-thirds of the men were aged 50–70, two-thirds of the women were aged 60–80. Women of equal age have a better chance of survival than men; but fatality increases with advancing years and these two opposed effects cancelled out, so it was not necessary to differentiate between the sexes. Surprisingly, there was no appreciable difference in mortality-rate between those patients who were admitted in their first attack and those who had a clear-cut history of a previous infarction. The fatality-rate was unaffected by a previous history of angina of effort, or hypertension. It seems to make no difference whether the attack occurs during exertion or comes on at rest. The really bad prognostic findings are, as so many physicians have emphasised, the presence of early shock and hypotension.

HONEY and TRUELOVE have examined very critically the data about their patients treated or not treated with anticoagulants and conclude that their figures show that anticoagulants "have had only a small beneficial effect on the fatality of myocardial infarction." They calculate that in the period 1952–54, when anticoagulants were extensively used, out of 263 admissions only 11 lives were saved by this treatment—i.e., the mortality was 11 lives less than would have been expected from previous experience with 263 cases of the same clinical characteristics. Examination of post-mortem records showed very clearly that the reduction in deaths accompanying anticoagulant treatment was largely due to the elimination of pulmonary embolism as a cause of death. Before anticoagulants were used, 6% of the patients who survived the first forty-eight hours after onset died from pulmonary embolism; in 1952–54 only 1% died. HONEY and TRUELOVE consider that their figures show that "anticoagulants do not have any major influence upon the course of an established myocardial infarct per se, although they save some lives by removing almost completely the dangerous complication of pulmonary embolism." These conclusions are indeed in striking contrast to those of IRVING WRIGHT and the American Heart Association's survey, and to those of GILCHRIST and his associates in Edinburgh. IRVING WRIGHT has restated his opinion,[3] supported by many others, that "if a patient suffers from a definite myocardial infarction, if there are no contra-indications and if good facilities are available, he should receive anticoagulant therapy." HONEY and TRUELOVE's answer to these claims is that the figures on which they are based have not been adequately analysed and, in particular, insufficient attention has been paid to bias in the selection of patients which has the effect of exaggerating good results—by this they mean the tendency to allot relatively poor risk patients to the "control" untreated groups. They point out that bias in selection of this type can be shown to account for previous good results reported from their own hospital with the same patients in the period 1948–51.

In their second paper HONEY and TRUELOVE assembled facts about the long-term prognosis, derived from their well-observed group. They found that 1 patient in every 10 admitted died within forty-eight hours, and one-third of the patients were dead by the end of the eighth week; after two years had elapsed half the original patients were dead. Thereafter the risk of dying diminishes; another 10% died in the

1. *Lancet*, 1956, i, 559.
2. Honey, G. E., Truelove, S. C. *Ibid*, June 8, 1957, p. 1155; *Ibid*, June 15, 1957, p. 1209.
3. Wright, I. S. *J. Amer. med. Ass.* 1957, **163**, 918.

next three years, and by the end of five years 3 out of 5 patients were dead. Of the patients who survived the acute attack, 10% died during the succeeding four months, and factors of bad prognosis in this group were evidence of cardiac distress in the early period of the acute attack—i.e., cardiac failure or enlargement, or the occurrence of arrhythmias—and a history of previous myocardial infarction. When patients are classified as "bad risks" or "good risks" according to the criteria of RUSSEK and ZOHMAN, the bad-risk patients are four times as liable to die in the first year as the good risks, and twice as liable in the second year; but after the second year there is no difference. Good-risk patients over the age of 60 have a better prognosis than younger patients, because younger patients are more liable to recurrence. (Oddly enough, according to MORRIS et al.,[4] this does not apply to medical practitioners.) HONEY and TRUELOVE point out that it is therefore very important to find out whether long-term anticoagulant treatment will reduce the recurrence-rate in these good-risk patients under 60 years of age; and their figures will provide a standard for comparison since only a very few of their patients had this form of treatment. So far no comparably large series of cases is available for analysis. KEYES et al.[5] treated a group of 121 cases for varying periods up to thirty-eight months and considered that the mortality from recurrence was much reduced, but their figures are not very closely analysed. They do warn physicians that stopping long-term anticoagulant treatment is very liable to be followed by a further acute myocardial infarction. SCHLACHMAN [6] recorded 3 patients whose anticoagulant treatment was begun as soon as premonitory symptoms occurred, but it did not arrest the progress of the myocardial infarct. Such findings warn us that long-term anticoagulant therapy is not to be lightly undertaken.

HONEY and TRUELOVE's conclusions and criticism of previous workers' results are unlikely to pass unchallenged by the supporters of anticoagulant treatment for all. But they are not alone in their views. RUSSEK and ZOHMAN,[7] for example, have again expressed the opinion that "anticoagulant therapy, which has certain hazards, is neither necessary nor desirable for patients who have been classified as good risks . . ." They give data about 511 good-risk patients who were not treated with anticoagulants; the patients were closely watched for thrombo-embolic complications, which have occurred in only 19 (3·7%) of the cases and were always mild; only 18 (3·5%) deaths occurred in this group. RUSSEK and ZOHMAN do, however, recommend anticoagulant treatment for poor-risk patients.

The ordinary practitioner has therefore to come to a decision about individual cases in a field where experts continue to disagree. He is likely to note that the opposing views are largely a matter of differing application of statistical methods of analysis to similar data. But the arguments of HONEY and TRUELOVE and those who share their views will reinforce the physician's conviction, which must be communicated to anxious relatives, that not every patient with myocardial infarction needs admission to hospital; and MORGAN JONES's [8] advice on the relative risks of transportation to hospital or no anticoagulants for the good-risk patient is still a good guide. On the other hand, HONEY and TRUELOVE's statistics are unlikely, we think, to deflect hospital physicians from treating poor-risk patients with anticoagulants as soon as possible. As GILCHRIST and TULLOCH [9] would doubtless remark, the saving of 11 lives in 263 patients is worth the effort.

4. Morris, J. N., Heady, J. A., Barley, R. G. *Brit. Heart J.* 1957, **19**, 227.
5. Keyes, J. W., Drake, E. H., Smith, F. J. *Circulation*, 1956, **14**, 254.
6. Schlachman, M. *Ann. intern. Med.* 1957, **46**, 728.
7. Russek, H. I., Zohman, B. L. *J. Amer. med. Ass.* 1957, **163**, 922.

Annotations

AN EPIDEMIOLOGICAL STUDY OF MONGOLISM

IN the past, the epidemiological approach to the causation of congenital malformations has been neglected. It is probable that there are major variations in the incidence of malformations from country to country: one instance is the high incidence of congenital dislocation of the hip in parts of Italy. Some of these variations may depend on differences in gene frequencies, others on environmental differences; and these should be discoverable by epidemiological study.

In an article on p. 1314, Dr. Pleydell (who has previously made a valuable study of Huntington's chorea in his county [10]) reports an epidemiological study in Northamptonshire of four types of malformation of unknown ætiology—mongolism, congenital malformations of the heart, hare-lip and cleft palate, and major malformations of the central nervous system. He finds some apparently remarkable groupings in the births of children with these malformations, particularly mongolism, over the years 1944–55. Thus of 13 mongols born in the county of Northampton in 1947–48, no less than 5 were born in the Rushden area, whose population is less than a tenth of that of the county. In evaluating apparent coincidences of this kind, it is important to discover whether they differ significantly from the random distribution. Dr. Pleydell does not give the details of his subdivision of the county, but two models will illustrate the possibilities of analysis.

Let us suppose that the county is split into 100 regions, each with a population of about 3000 and about 50 births a year, and assume that the risk of any birth producing a mongol baby is 1 in 500 (Pleydell's figure of 1 in 613 agrees well with other surveys). Over a ten-year period of a total of 1000 region-years the number with no mongol births would be about 905, the number with 1 mongol birth about $90\frac{1}{2}$, with 2 about $4\frac{1}{2}$, and with 3 about $\frac{1}{7}$. That is to say, the odds would be only about 6 to 1 against any region having 3 mongol children born in a year. Not less than 4 mongols born in one region, in one year of a ten-year period, would be remarkable in populations grouped in this way. In this light, that 3 mongols were born in nine months in Irthlingborough (population 4700) in 1947 is not by itself surprising. Taking larger regions, with populations of about 30,000, and annual births about 500, the odds against 5 mongols being born in one year in such an area are only between 2 and 3 to 1, and only 7 or more in a year in a population of this size would be really noteworthy. But these are exceptional individual events and an accumulation of discrepancies in different areas of the kind Dr. Pleydell describes, each not significant in itself, might well be meaningful in combination.

Now that Dr. Pleydell has formulated the hypothesis that births of mongols are not random in time and space, we hope that it will be checked in one or two other counties. There is no need for the population of the county to be subdivided into units of exactly equal size; but the subdivision should be fixed before the inquiry is made, and then the pattern of mongol births compared with what might be expected by chance.

8. Morgan Jones, A. *Brit. med. J.* 1955, ii, 1613.
9. Gilchrist, A. R., Tulloch, J. A. *Scot. med. J.* 1956, **1**, 1.
10. Pleydell, M. J. *Brit. med. J.* 1954, ii, 1121.

A second suggestion of Dr. Pleydell's is that there has been a seasonal incidence of the mongol births in his twelve-year period of study, and that this may be related to the incidence of scarlet fever some seven or eight months previously. This is an interesting hypothesis, but it needs confirmation since Pleydell's own findings as tabulated do not show a seasonal distribution greatly different from random expectation. It is improbable that any short-lived infection in pregnancy could by itself be the cause of mongolism, even though the incidence of streptococcal infections varies with age. For example, though (as Dr. Pleydell notes) there are age-specific differences in the incidence of streptococcal infection, it is difficult to explain in this way the fiftyfold increase in the incidence of mongolism from mothers aged 20 to mothers aged 45. But such environmental findings may play an important subsidiary rôle in mongolism, and even the main rôle in other malformations such as those of the heart.

TESTOSTERONE THERAPY IN STUNTED CHILDREN

THOUGH testosterone is sometimes given to promote growth in stunted children, there are very few careful studies of its results. The difficulty is largely one of knowing what growth would have taken place in the absence of the hormone; and, short of treating one of a pair of identical twins, no perfect control is possible. The child's progress should be followed for six months to a year before any therapy is given, and thereafter with or without therapy for several years—if possible to full maturity. A recent study by Sobel et al.[1] goes a long way towards meeting this criterion, and considerably clarifies the main issue: whether the immediate increase in height is ultimately outweighed by the earlier closure of the epiphyses also thought to be brought about by the hormone.

Sobel et al. studied 27 stunted children aged 5 to 10 years (thus avoiding the complications of the adolescent spurt in growth). They assessed their results by following on the one hand the increase in height, and on the other the increase in skeletal age—the latter being estimated in the usual way from radiographs of the hand and wrist. During six months before therapy, these children developed more slowly than was expected from the standards for Boston children, increasing by 4·7 months of average growth in height and by 4·3 months in skeletal age. Testosterone was then given daily for six months, and there was a fairly sharp acceleration in height-growth and in skeletal maturation. Height increased during these six months by the equivalent of 12·1 months of average growth, and reverted in the following year, without therapy, to the near-average figure of 13·2 months of average growth. Skeletal age increased 13·9 months during the six-month therapy period, and during the ensuing year continued to develop at above-average rate, advancing 17·0 months.

Though it is usually believed that testosterone causes epiphyseal closure, the evidence for this is confused and contradictory, and indeed very little is known of the hormonal control of skeletal maturation—that is, of the "bone age"—in children.[2] Under the abnormal stimulus of androgens in precocious puberty, the bone age is advanced, the epiphyses close early, and permanent stunting results. Sobel et al. now show that methyltestosterone 5 mg. a day by mouth for six months accelerates bony development though without closing the epiphyses. But in just over half the cases the acceleration in bony development was proportionally greater than the acceleration in height; and if therapy had been persisted in the effect would ultimately have been the reverse of what was desired. Despite the immediate gain in height, the end-result would have been still greater stunting. At present no effective preparation of growth-hormone is available; and while we wait for it, we should evidently avoid substitutes that do more harm than good.

1. Sobel, E. H., Raymond, C. S., Quinn, K. V., Talbot, N. B. *J. clin. Endocrin.* 1956, **16**, 241.
2. Tanner, J. M. Growth at Adolescence. Oxford, 1955; pp. 52, 129.

PROTECTION AGAINST RADIATION

ONE important way of minimising the dangers of ionising radiation is to ensure that everyone who works with machines or substances producing such radiation understands their power and adheres to rules known to be safe. A new code of practice for the protection of radiation workers is published this week.[1] Prepared by the standing advisory committee, under the chairmanship of Sir Charles Darwin, F.R.S., which was set up under the Radioactive Substances Act to advise Ministers, the code is intended primarily for the protection of persons exposed to ionising radiations in hospitals in the National Health Service.

The code deals chiefly with technical data concerned in assessing the necessary safeguards to the users of X-ray and other radiological apparatus, such as cobalt therapy units, and radioactive isotopes. It has been designed, as far as possible, as a set of purely technical rules. The first part contains the rules applicable to the use of X rays in diagnosis and of X rays and γ rays in therapy; and the second part sets out rules for the diagnostic or therapeutic uses of radioactive isotopes, either sealed or unsealed. A supplement records the relevant fundamental data and technical details about the design of diagnostic and therapy departments.

Though the code makes no new scientific contribution, it incorporates much of the latest evidence, including the views of the Medical Research Council committee on the hazards of radiation, and it is a valuable working manual that will do much to fortify safety precautions. The Minister of Health has sent copies to hospital authorities and has asked them to ensure that where necessary safety standards in radiological departments are brought into line with the code. He emphasises that the clinical freedom of the individual consultant will not be restricted, but it has become essential, he adds, to secure a definite minimum standard of safety precautions and to place upon the head of the department the responsibility for maintaining that standard.

POSTOPERATIVE SICKNESS

POSTOPERATIVE sickness is still one of the commonest complications of surgery and anæsthesia. The principal predisposing factors are the use of opiates for premedication and postoperative analgesia, inhalational anæsthetic agents, and long major operations.

The emetic effects of morphine are well known; but pethidine—though less troublesome in this respect—considerably increases postoperative sickness when given intravenously during an operation. Burtles and Peckett[2] record an incidence of postoperative sickness of 18% after thiopentone, nitrous oxide, and oxygen, rising to 30% with the addition of intravenous pethidine; and an incidence of 26% with a similar anæsthetic sequence and trichlorethylene, rising to 46% with added pethidine. All the potent inhalational anæsthetic agents are likely to produce some sickness, but ether remains the greatest offender amongst those commonly used.

The site of surgery is probably of little importance (if operations on or near the labyrinth are excluded), and contrary to common belief intraperitoneal operations are no more likely than others to produce vomiting.[3] But the incidence is high after protracted and major opera-

1. Code of Practice for the Protection of Persons exposed to Ionising Radiations. H.M. Stationery Office. Pp. 83. 8s.
2. Burtles, R., Peckett, B. W. *Brit. J. Anæsth.* 1957, **29**, 114.
3. Knapp, M. R., Beecher, H. K. *J. Amer. med. Ass.* 1956, **160**, 376.

tions. Women are more susceptible than men, and advancing years seem to lead to increasing resistance. Other factors worth remembering are badly administered anæsthesia (which may result in severe anoxia or carbon-dioxide retention), idiosyncrasy (history of sickness after a previous operation or of travel sickness), and the emetic effect of anything more than occasional sips of fluid immediately after operation.

Appreciating these and other ætiological features, the anæsthetist can vary his technique to suit the patient's requirements, but for general prevention and treatment the phenothiazine drugs offer the best prospect of success. The value of these agents stems from their depressant effect on the region of the vomiting-centre, so that whatever the cause they are likely to work. In susceptible patients they may not entirely prevent vomiting, but they usually reduce its severity. Burtles and Peckett [3] found an overall sickness-rate of 30% in their control series, but this fell by half when a phenothiazine drug was given as part of the premedication. They chose either promethazine or chlorpromazine; but ultimately they preferred the former, since with it such side-effects as cerebral depression, dizziness, and postural hypotension were less troublesome. Various workers have remarked on these side-effects of the phenothiazine drugs, and in certain circumstances it may be safer to accept the disadvantages of postoperative sickness than to add to the danger of the operation in this way. In any event severe sickness is rare: in Burtles and Peckett's series only 2·8% of patients vomited more than four times.

BENIGN MYALGIC ENCEPHALOMYELITIS

LAST year we suggested the name "benign myalgic encephalomyelitis" [4] for an epidemic disease which is either new or has become very much more frequent than formerly. It is a disease of rapid onset characterised by: (1) symptoms and signs of damage to the brain or spinal cord (lower-motor-neurone palsies may lead to confusion with anterior poliomyelitis); (2) protracted muscle pain; (3) emotional disturbance, notably depression, extending into convalescence; (4) normal cerebrospinal fluid (C.S.F.), although headache and stiff neck are common; (5) reticulo-endothelial reaction in some cases; (6) a protracted course, often with relapses; and (7) a benign outcome in almost all cases.

In London the Royal Free group of hospitals experienced a severe outbreak of a disease which apparently falls into this category, and its epidemiology has recently been described.[5] The incubation period is usually 4–8 days, so an epidemic is likely to be explosive. In this instance there were two fresh cases in the 3rd week of the epidemic, whereas in the 5th week there were fifty. Although a few cases were found in which the disease was acquired from a single symptomless carrier, it was commonly transmitted by frequent personal contact, and in those circumstances the incidence of the disease was high. Thus in the section of the hospital where the first case occurred 55% of the nurses contracted the disease within a month. Since the largest number of cases was among nurses, the various types of worker in the hospital were roughly grouped according to the relative frequency with which each came into contact with members of the nursing staff, and the incidence of the disease in each group broadly corresponded with the frequency of contact. The importance of frequent contact in the spread of the disease is also indicated by the low incidence of the disease outside the hospital when it was at its height among the hospital staff. In contrast to the influence of frequent personal contact a search for a vehicle of infection—water, milk, food, laundry, insects—revealed no common links between cases. There was no good evidence that age or sex affected liability to the disease, except in so far as these factors affected the probability of an individual being frequently exposed to infection. Attempts were made to isolate the responsible virus at various stages of infection from nose, throat, blood, and bowel, but without success. Serological tests were negative except that nearly 80% of those affected showed heterophil antibody in a titre of 1/40 or higher; but of these antibodies less than 4% were of infectious-mononucleosis type.

This epidemiological study indicates that the risk of infection is greatest for anyone exposed to many infective persons, as in any form of community life, and that, on the contrary, in smaller units such as the home the risk of spread is slight. At the Royal Free the epidemic was cut short by sending all the nurses home and keeping them under observation through their own family doctors; and no secondary case occurred as a result.[6] Since the work of a large group of hospitals can be paralysed by an epidemic of benign myalgic encephalomyelitis, it is important to know of the success of this measure. The management of an epidemic of benign encephalomyelitis is the reverse of that generally recommended for an epidemic of poliomyelitis in a closed community, such as a residential school, where sending all the children home is likely to disseminate the disease.

SKIN GRAFTING BY THE EXPOSURE METHOD

SURGEONS often teach that skin is the best dressing, yet even with the high price of gauze and cotton-wool today not all of them practise what they preach. Sir John Bland-Sutton, it is said, thought that well-laundered sheets were the only cover needed by a healthy wound, and a return to this principle has lately been evident in the popularity of a pliable plastic film, sprayed on to the wound.[7] The main value of the orthodox dressing is its absorbency, and the barrier to infection which it provides; and in freely draining wounds in which the risk of contamination is high because of their wetness there is still no better covering. It is now recognised, on the other hand, that where the exudate is reasonably scanty, and contains (as it usually does) fluid protein, it will coagulate on the surface and provide an effective natural barrier. Moreover this layer can easily be damaged by the pressure and movement of dressings; and fluid exudate, soaking into the gauze, may form an ideal medium for cross-infecting organisms. In the treatment of burns the exposure method is simple and often effective, and the progress of the burn can be observed and the moment chosen for surgical intervention in the doubtful case.

In the more unfavourable situations split skin grafting is bedevilled by the risk of movement or pressure by the dressings displacing the newly adherent grafts, particularly where low-grade infection (so difficult to eliminate from granulating surfaces) tends to cause the grafts to float off in their first few days. Cannon [8] has found that with the exposure method split skin cover is feasible in many different circumstances—mobile areas such as the lower part of the abdominal wall, and the hand; moist wounds such as the granulating edges of a cerebrospinal-fluid fistula, and lesions of the buttocks and thighs in paraplegic patients; and bony cavities once lined by granulation tissue. This is just the kind of development which would have appealed to Ambroise Paré: the replacement of an unsatisfactory ritual method by a simpler and apparently more effective one.

Lord COHEN of BIRKENHEAD has been elected chairman of the Central Health Services Council in succession to Sir FREDERICK MESSER. Sir CECIL OAKES succeeds Lord Cohen as vice-chairman.

4. *Lancet*, 1956, i, 789.
5. Crowley, N., Nelson, M., Stovin, S. *J. Hyg., Camb.* 1957, **55**, 102.
6. Geffern, D. *Publ. Hlth, Lond.* 1957, **71**, 13.
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The Wider World

REFLECTIONS ON MEDICAL TRAVEL

L. J. WITTS
D.M. Oxfd, M.D. Manc., Hon. Sc.D. Dubl., F.R.C.P.
NUFFIELD PROFESSOR OF CLINICAL MEDICINE, UNIVERSITY OF OXFORD

(*concluded from p. 1292*)

One of the surprising things about the world is how little all the various modes of communication—talking, writing, photography, cinema, radio, and television—have prepared one for it. Like psycho-analysis, it must be experienced to be appreciated. Who would have expected that one's auditory memory of San Francisco would have been the droning of fog-horns, of Bangkok the barking of dogs, and of Calcutta the cawing of crows? Who would have supposed that Australian weather is even more unpredictable than British? Who could have visualised, without seeing it, the squalor of the cities of the East, where the growth of population is exploding in an unpredictable chain reaction? Who could have imagined the dinner of an Indian medical association, held in an enormous marquee like one of the tents of Genghis Khan, on a night so chilly after a summery day that the women all wore overcoats, and with the cold comfort of cocktails of lemonade and passion-fruit juice? But, indeed, who could have imagined the miraculous beauty of India in the autumn, the light of the morning and the dust of the evening on the plains, the entrancing dress of the women, the colour that flames out of poverty? Indian civilisation is as stable as the old red sandstone of its buildings, and out of it flowers an idealism like the airy cupolas and minarets that float above its forts and temples.

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Having known Australians and New Zealanders as a combative people, one of the surprises was to find them so amiable in their native land. Indeed, Australians and New Zealanders differ from birds and dogs in being much more aggressive when they are abroad than when they are in their own territories. They tell me we are the same. At any rate, nothing can rival the friendliness and hospitality with which the Englishman is welcomed in Australia and New Zealand. One is, of course, appalled by some aspects of the social scene in Australia—the evening swill of drink, the gambling, the lotteries, and the social strife. One sometimes gets the impression that the aim of the Australian trades-unions is to stop people working, and the aim of the Churches is to stop people enjoying themselves; but who are we to talk, with shipbuilders, engineers, railwaymen, and doctors behaving as they are? With all its faults, however, Australian democracy is more real than any I have experienced elsewhere, and it is not overshadowed by plutocracy as it is in the United States of America. The Australian taxi-driver is just as delightful and helpful as the Spanish, and that is saying a great deal. You sit alongside him in the Holden cab and talk like two equals, and you learn a great deal about the country in the process. He may, indeed, give you a good tip for the races you are just going to, and you may find that his brother owns a racehorse.

Australian medicine is the apotheosis of private practice, extreme efficiency in the practical aspects of medicine being combined with a deficiency in that academic framework of the teaching hospitals which has made German medicine in the past and American medicine in our own time so great. This is being remedied by the creation of new professorial units, but the struggle will be an uphill one. Australian thought, at any rate in the professions, is intensely hostile to control by the State, and whole-time medicine is suspected of being a Trojan horse. The various medical insurance schemes which have been introduced encourage the independence of the practitioner and the maintenance of private practice, but they probably do not promote the most efficient development and use of medical services, hospitals, and university clinical departments. It is much more difficult to run a diabetic clinic or a hæmophilia reference centre in Australia than in this country, because the combined cost of transport to the hospital and treatment there is so much higher than the cost of treatment by the local practitioner.

I am not persuaded that all Australian doctors should be trained in operative gynæcology, obstetrics and surgery. A man in a group practice of 6000 cannot be a first-class surgeon, and so long as such a high proportion of the population lives in five of the State capitals where excellent hospital facilities are available, one would deprecate amateur surgery. A great deal of the emphasis on the necessity for the general practitioner to be able to do surgery and major obstetrics seems to spring from the desire to give the practitioner an interesting and lucrative career rather than from the desire to give the cheapest and best service to the public. Anyone who challenges a cherished national concept like that of the Australian doctor, located in the outback, hundreds of miles from help, self-sufficient and omnicompetent, is likely to provoke a violent reaction; but the gearing of the whole organisation of medicine to this uncommon person may not now be for the best. A follow-up of the careers of a representative sample of Australian students qualified since the war would be of great value. Just as production changes—first subsistence agriculture, then a smaller and smaller proportion of the population as primary producers (in Australia not more than one in ten)—so medical practice changes; and in England now only 40% of those graduating go into general practice, the others being absorbed in diagnostic services, consultative work, preventive medicine, and similar specialised activities.

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An aspect of Australian democracy that is surprising to the Englishman, who has perhaps forgotten how many Australian families were driven there by the harsh penal laws of Great Britain and how many were kept in virtual slavery to British administrators, merchants, and landowners when they arrived, is that her Asiatic neighbours are prepared to regard Australia as a liberated colony and an anti-colonial power. In addition, they do not fear her economic and military might as they fear that of America, China, and Russia. Hence, they turn to Australia for advice and technical assistance. A Scotsman, now professor of medicine in an Australian university, spoke movingly of the chagrin he had felt on a mission to Indonesia, in which for the first time in his life he had had to conceal the fact that he was a Scotsman. Australia is taking an active part in the Colombo Plan, and on visiting the classrooms and libraries in the universities one is surprised by the high proportion of Asiatics among the students and readers. Indeed, Australia is putting us to shame by the contribution she is making to education and scientific developments in Asia and Melanesia, and is illustrating the new pattern of empire in which we should be taking a greater part.

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On passing from Australia to the Far East, one feels as if one had moved back in time to Edinburgh or Dublin of fifty years ago, except that the classes are much larger. There is excessive emphasis on anatomy and pharmacognosy, because these subjects are easy to teach with primitive facilities. There is a great shortage of modern apparatus for physiology, biochemistry, and clinical pathology, and an equal shortage of teachers and technical staff. The teachers themselves are well aware

of these defects. At the clinical level there are great deficiencies in social and preventive medicine, pædiatrics, and psychiatry.[2] By social medicine is meant not the detailed case-taking—in many respects the modern equivalent of slumming—which is so dear to the hearts of British almoners and which has made the subject so distasteful to the average British medical student. It means public health, the medicine of communities, and in particular the medicine of communities in which the income per head and the proportion of doctors to patients are very small.

This is not to say that there are not institutes in the Far East and particularly in India which can compare with the best in Europe and America. New hospitals are being built and American aid is being poured in. The Americans are readier or better able than we to use the device of adoption of a school overseas by one in the United States and to arrange an interflow of staff—of trainees to the United States and of senior American staff and technicians to Asia. English is the key language to the world's scientific literature, and in view of the costs and delays of translation it is unlikely to be replaced by languages such as Hindi or Arabic as a medium of scientific instruction. So long as English remains the lingua-franca of medical teaching, exchanges are essential, for there is a tendency for spoken English in India to diverge from the language spoken in England and America as spoken Latin diverged in Italy and Spain. The gain of these exchanges is not all on one side. There are great opportunities for research in Asia, whether in old fields such as the treatment of tuberculosis or in new ones such as the abnormal hæmoglobins.

It is all too easy to sneer at the efforts of the Asian and African students who come to this country to take a higher qualification in medicine or surgery, to lament that their previous training is defective and to assert that the Asian student may learn theory with the greatest of ease but is no good at getting to grips with the real world. Doubtless the social background in the East, with its enormous labour surplus, makes men and women used to being waited on hand and foot; but it does not prevent the development of doctors and nurses of great practical competence. Indeed, the Pakistani girl who has come direct from purdah to become a doctor or nurse has made a much greater step forward than the British student of medicine or nursing.

* * *

The desire for British or American higher qualifications is a good aspect of the nationalism which dominates world thought today. Just as every country must have air-lines, air-hostesses, air-fields, radio, and if possible television, of international standards, so too its medical teachers must be of international status. Moreover, only an external criterion of ability can prevent the nepotism which is still such a danger. It is for these reasons that in much of Asia today it is almost impossible for a man to get on the staff of a teaching hospital without having studied abroad and obtained a British or American higher degree.

This is almost certainly a temporary phase. When the peoples of Asia and Africa become more assured, they will probably no more think of coming here to take the M.R.C.P. or the F.R.C.S. than an American or European postgraduate student does today. While the phase lasts, however, we should bend every effort to help. Wherever one goes in medical circles in India and the Far East, the conversation soon turns to the difficulties which face their young men and women in getting house-appointments in this country (even though they are sponsored by their universities), the difficulties of temporary registration, and the difficulties of satisfying the preliminary conditions for sitting examinations such as the membership of the College of Physicians. It is freely stated that we make much greater difficulties than the Americans. There is a desire for English external examiners, inspectors, and postgraduate lecturers who will make the preparation for higher degrees more efficient.

* * *

I have said this is a temporary phase, because by and large Western medicine provides an unsuitable training for the problems of the East. They need an autochthonous form of medical education. Experiments on new lines have already been carried out at Vellore and Ludhiana, where medical education is oriented to public health and it is as important for the student to work at the rural health centre as to walk the wards of the hospital. The most important experiment is the All India Institute of Medical Sciences, which is being built at Delhi to be the Indian Johns Hopkins Hospital and train the teachers and researchers of the future. The number of students will be small and they will be selected from the whole of India. Facilities and staff will be provided on a relatively lavish scale.

It is doubtful whether at the start India will be able to staff this institute unaided and she will probably be anxious for help from England and America. Such help will have to be on a short-term basis, because India will naturally want the project to be firmly in Indian hands. The seconding of an English medical teacher to work for, say, two years in Delhi bristles with difficulties because heads of departments cannot easily be away so long and younger men fear the loss of promotion during an absence. In addition, living expenses may well be high. However, the compensations would be great. In the ordinary way I share Sir Robert Hutchison's view of "that most boring of subjects, the medical curriculum"; but working out a medical curriculum for India could be exciting, for in India and the Far East people must sit down and think out from the beginning what they are training doctors for and the best way of doing it.

The visitor to India cannot but marvel at the outburst of creative energy liberated by independence, the enthusiasm for planning and the immensity of the tasks to be completed. At the top levels of their health service there has been a fusion of the best elements of the traditions of the Indian Medical Service, the Indian Civil Service, and the Congress Party into a precept of idealism and dedication to duty which fills the sympathetic visitor with respect. Like Wordsworth witnessing the French revolution, he murmurs, "Bliss was it in that dawn to be alive." Friendship to Britain is sincere, and it is surprising how tolerantly the relics of our domination have been preserved, for some of the manifestations of the Victoria cult were as inartistic as those of the Stalin cult. Pakistan is a smaller and poorer country than India, but friendship to Britain is as strong there or stronger and the desire for our coöperation in education and the advancement of science equally great.

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When I was a boy at the local grammar school, an old friend of my mother's used to say, "Put the lad in the Borough Treasurer's office and then he'll be right for life." The institution of the Welfare State has unfortunately set the seal of approval on the philosophy of being right for life and has weighted the odds against adventure. It is only necessary to read the autobiographical writings of Conan Doyle to realise how much harder were the conditions young doctors without means had to face two or three generations ago. Conan Doyle spent seven months on a whaling-ship in his final year to get the money to qualify. After qualification he had to go to sea again as ship's surgeon on the *Mayumba*, and on his return he complained of having had African fever, of having nearly been eaten by a shark, and of his ship catching fire in mid-ocean. Despite his penury he refused

2. Taylor, C. E. *New Engl. J. Med.* 1956, **255**, 897.

help from wealthy Catholic relatives because he was an agnostic.

Two wars and conscription have blunted our appetite for the *Wanderjahre* and we have organised a national health service that makes no provision for the prodigal's return. We do not make experience in Africa or Asia a sine-qua-non for a consultant appointment, as the Belgians and the Dutch used to do. Instead, the senior medical registrar casts a lean and hungry look at the 20 openings a year for more than 200 of his kind, and fears with justification that if he gets off the local ladder of promotion, even for a year or two, he will never get on again. No longer can the man who has spent twenty or thirty years working in the tropical sun return home and buy a comfortable small practice with opportunities for hunting and fishing. In too much of our planning since the war we have been parochially minded.

Conclusion

The reward of travel is to see one's own country in perspective, and my main impression is of the central position we occupy in the thoughts of diverse peoples, and of our responsibility to continue to help in the control of disease and the training of doctors in our former dominions now that we have been divested of the material trappings of empire. More than once I have seen again in my own daydreams the man who appeared in a vision to St. Paul saying, "Come over into Macedonia, and help us."

A second impression is of the great and lasting effect that may be produced on visitors to this country by some brief encounter which we too quickly forget. Listening to votes of thanks ten thousand miles away from home, I have learnt for the first time how much it means to a man to come to this country, to find that there are people who are bubbling over with enthusiasm about some small field of specialisation or research over which he himself had hitherto felt a little self-conscious, or, unfortunately, to meet someone like Martha who is too busy with the daily chores to put work aside and talk to the stranger.

If one writes freely, as I have tried to do, it is hard to avoid saying things which may be misinterpreted or may unintentionally hurt, and I must therefore stress my final impression, which is of the open-hearted friendship and bountiful hospitality which the English visitor receives abroad and the sense of obligation with which he returns. Nor should I like to close without praising the British Council, whose merits are so much better appreciated abroad than at home and whose advice and hospitality are so generously offered to the traveller from this country.

Medicine and the Law

Insulin Coma in a Driver

A DIABETIC patient was found by a policeman in his invalid-carriage at the entrance to his garage.[1] He had had hospital treatment. He told police that if he had felt a turn coming on he would have taken a lump of sugar which he always carried with him.

He was accused of being in charge of a motorised invalid-carriage while under the influence of a drug. The prosecution said that he had taken a dose of insulin that had made him go into coma. A physician, referring to the patient's lump of sugar, said: "It is in that way that most of our diabetics keep out of court."

The patient was found guilty, but given an absolute discharge. The defence considered it "a vital case from the point of view of diabetics who drive."

1. *Times*, June 21.

Special Articles

MEDICAL RESEARCH COUNCIL'S STATEMENT ON TOBACCO SMOKING AND CANCER OF THE LUNG

THE following statement has been issued by the Medical Research Council.

THE INCREASE IN LUNG CANCER

In their annual report for 1948–50 the Council drew attention to the very great increase that had taken place in the death-rate from lung cancer over the previous twenty-five years. Since that time the death-rate has continued to rise, and in 1955 it reached a level more than double that recorded only ten years earlier (388 deaths per million of the population in 1955 compared with 188 in 1945). Among males the disease is now responsible for approximately 1 in 18 of all deaths. Although the death-rate for females is still comparatively low, it also has shown a considerable increase in recent years and the disease is now responsible for 1 in 103 of all female deaths.

Three comments may be made on these figures. In the first place, the trend over the last few years indicates that the incidence has not yet reached its peak. Secondly, the figures are not to be explained as a mere reflection of the introduction and increasing use of improved methods of diagnosis but must be accepted as representing, in the main, a real rise in the incidence of the disease, to an extent which has occurred with no other form of cancer. Thirdly, only a small part of the rise can be attributed to the larger numbers of older persons now living in the population; in the last ten years the lung-cancer death-rates among both men and women have risen at all ages from early middle-life onwards.

POSSIBLE CAUSES OF THE INCREASE

The extent and rapidity of the increase in lung cancer point clearly to some potent environmental influence which has become prevalent in the past half-century and to which different countries, and presumably also men as compared with women, have been unequally exposed. The pattern of incidence of the disease rules out any possibility that the increase can be due, in a substantial degree, to special conditions, such as occupational hazards, affecting only limited groups. It is necessary to seek some factor or factors distributed generally throughout the population, and in considering the possibilities it must be borne in mind that a very long period, 20 years or more, may elapse between exposure to a carcinogenic agent and the production of a tumour. From the nature of the disease attention has focused on two main environmental factors: (1) the smoking of tobacco, and (2) atmospheric pollution—whether from homes, factories, or the internal combustion engine.

SMOKING AS A CAUSE OF LUNG CANCER

Epidemiological Surveys

The evidence that heavy and prolonged smoking of tobacco, particularly in the form of cigarettes, is associated with an increased risk of lung cancer is not based on the observation that the substantial increase in the national mortality followed an increase in the national consumption of cigarettes. It is derived from two types of special inquiry. In the first, patients with lung cancer have been interviewed and their *previous* histories in relation to smoking and other factors that might be relevant have been compared with those similarly obtained from patients without lung cancer. The results of nineteen such inquiries (in this country, the U.S.A., Finland, Germany, Holland, Norway, and Switzerland) have been published. They agree in showing more

smokers and fewer non-smokers among the patients with lung cancer, and a steadily rising mortality as the amount of smoking increases. In the second type of inquiry, information has been obtained about the smoking habits of each member of a defined group in the population and the causes of the deaths occurring *subsequently* in the group have been ascertained. There have been two such investigations, one in the U.S.A. covering 190,000 men aged 50–69, and the other in this country covering over 40,000 men and women whose names appeared on the Medical Register of 1951. In both, the results have been essentially the same. The investigation in this country, which has now been in progress for more than five years, has shown with regard to lung cancer in men :

(1) A higher mortality in smokers than in non-smokers.

(2) A higher mortality in heavy smokers than in light smokers.

(3) A higher mortality in cigarette smokers than in pipe smokers.

(4) A higher mortality in those who continued to smoke than in those who gave it up.

It follows that the highest mortalities were found among men who were continuing to smoke cigarettes, heavy smokers in this group having a death-rate nearly 40 times the rate among non-smokers. Although no precise calculation can be made of the proportion of life-long heavy cigarette smokers who will die of lung cancer, the evidence suggests that, at current death-rates, it is likely to be of the order of 1 in 8, whereas the corresponding figure for non-smokers would be of the order of 1 in 300. The observation on the effect of giving up smoking is particularly important, since it indicates that men who cease to smoke, even in their early forties, may reduce their likelihood of developing the disease by at least one half.

It should be noted that the excess of deaths from lung cancer among smokers was not compensated for by any corresponding reduction in the number of deaths from cancer of other sites in the body ; in other words, there was a total incidence of cancer in the smoking groups in excess of the incidence that would have prevailed in the absence of smoking.

It will be apparent from what has been said that the evidence from the many inquiries in the past eight years, both in this country and abroad, has been uniformly in one direction and is now very considerable. It has been further strengthened recently by the observation from several sources that the extent of the relationship with smoking differs for different types of lung tumour which can be distinguished only by microscopic examination.

Laboratory Evidence

From the physical and chemical point of view there is nothing inherently improbable in a connection between smoking and lung cancer. Tobacco smoke consists largely of microscopic oily droplets held in suspension in air, and these droplets are of a suitable size to be taken into the lungs and retained there. Over a hundred constituents have so far been identified and, among these, five substances have already been found which are known to be capable, in certain circumstances, of causing cancer in animals. Some workers have succeeded in producing tumours in animals by painting concentrated extracts of tobacco tar on the skin. Known carcinogens are present in tobacco smoke in very small amounts however, and there is no certainty that such low concentrations could be harmful to human beings. Nevertheless, the finding of carcinogenic agents in tobacco smoke is an important step forward, in that it provides a rational basis for the hypothesis of causation.

ATMOSPHERIC POLLUTION AS A CAUSE OF LUNG CANCER

It has been known for some years that mortality from lung cancer is greater in urban areas than in the country-side. This fact, together with the identification of carcinogenic substances in coal smoke and in motor-vehicle exhausts, has led to the supposition that exposure to atmospheric pollution may be concerned with the increase in lung cancer. The rôle of atmospheric pollution is particularly difficult to investigate however, and the evidence is neither so consistent nor so extensive as that relating to tobacco smoking. On the one hand, no excess mortality from lung cancer has been observed in persons who would be especially exposed by the nature of their work to atmospheric pollution—for example, transport workers, garage hands, and policemen. On the other hand, the results of a number of investigations have suggested that a relationship does exist between atmospheric pollution and lung cancer. Perhaps the best evidence for this relationship comes from studies of the small number of deaths from the disease among *non-smokers* in different types of residential district ; in these studies higher death-rates have been observed among non-smokers in large towns than among those in rural areas. On balance it seems likely that atmospheric pollution plays some part in causing the disease, but a relatively minor one in comparison with cigarette smoking.

ASSESSMENT OF THE EVIDENCE RELATING TO SMOKING AND LUNG CANCER

Knowledge of the causation of lung cancer is still incomplete. Many factors other than tobacco smoking are undoubtedly capable of producing the disease ; for example, at least five industrial causes have been recognised. Nevertheless, the evidence for an association between lung cancer and tobacco smoking has been steadily mounting throughout the past eight years and it is significant that, during the whole of this period, the most critical examination has failed to invalidate the main conclusions drawn from it. It has indeed been suggested that the fundamental cause may be some common factor underlying both the tendency to tobacco smoking and to the development of lung cancer some twenty-five to fifty years later, but no evidence has been produced in support of this hypothesis.

In scientific work, as in the practical affairs of everyday life, conclusions have often to be founded on the most reasonable and probable explanation of the observed facts and, so far, no adequate explanation for the large increase in the incidence of lung cancer has been advanced save that cigarette smoking is indeed the principal factor in the causation of the disease. The epidemiological evidence is now extensive and very detailed, and it follows a classical pattern upon which many advances in preventive medicine have been made in the past. It is clearly impossible to add to the evidence by means of an experiment in man. The council are, however, supporting a substantial amount of laboratory research which may throw more light on the mechanism by which tobacco smoke and other suspected causative factors exert their effect, and which may thus eventually add to the degree of proof already attained as a result of studies of human populations. It must be emphasised, however, that negative results from work with animals cannot invalidate conclusions drawn from observations on man.

CONCLUSIONS

1. A very great increase has occurred during the past twenty-five years in the death-rate from lung cancer in Great Britain and other countries.

2. A relatively small number of the total cases can be attributed to specific industrial hazards.

3. A proportion of cases, the exact extent of which cannot yet be defined, may be due to atmospheric pollution.

4. Evidence from many investigations in different countries indicates that a major part of the increase is

associated with tobacco smoking, particularly in the form of cigarettes. In the opinion of the Council, the most reasonable interpretation of this evidence is that the relationship is one of direct cause and effect.

5. The identification of several carcinogenic substances in tobacco smoke provides a rational basis for such a causal relationship.

REPORT ON MEDICAL RESEARCH

LUNG cancer, radiation hazards, vaccination against poliomyelitis, and genetics are among the chief topics of the Medical Research Council's latest report.[1]

The Council's activities complement those of hospitals and universities, and the Council provides for clinical research only when its scale, scope, or urgency dictates. Besides setting up its own permanent units, whose staffs have careers in research, the Council makes whole-time or part-time appointments to its external scientific staff, grants to independent workers, and awards for training in research. Moreover, it organises coöperative studies. At the national level, the Council allocates funds for the support of clinical research in both major schemes and individual projects. Decentralised research may be supported by regional hospital boards and boards of governors of teaching hospitals; here the Clinical Research Board can often give advice.

As before, the report includes an excellent succinct account of trends in selected fields of medical research. The many publications of the Council and its staff are then listed. They include the report on the *Hazards to Man of Nuclear and Allied Radiations*,[2] presented to Parliament as a white-paper.

Overseas liaison continues by means of units in Gambia, Jamaica, and Uganda. Research groups have been set up to study ageing, atmospheric pollution, inherited disease, and other topics, and units are being established to study (among other things) metabolic disturbances in surgery, carcinogens, and the effects of radiation.

Special attention is paid to *lung cancer* on account of its striking increase in late years; it is the cause of 1 in every 9 deaths in middle-aged men. Retrospective and prospective investigations all indicate a relationship between heavy smoking, especially of cigarettes, and most forms of lung cancer; and no investigation suggests absence of such a relationship. Carcinogens have been found in cigarette smoke; these induce hyperplasia in human fœtal lung grown in tissue-culture. Industrial hazards (e.g., from chrome and asbestos) and atmospheric pollution probably account for a small proportion of the cases. Statistical surveys and laboratory experiments are continuing.

Poliomyelitis vaccination in North America is by killed viruses of the Mahoney strain. For the British vaccine a less virulent (Brunenders) strain was chosen, but the rhesus monkey used for safety testing was found to be insensitive to this strain. A cynomolgus monkey (treated with cortisone, or cortisone and irradiation) is used. Antibody studies in children have shown that the British vaccine produces titres (against all three types of virus) which compare favourably with those found after use of the American vaccine. Experiments in monkeys show that the vaccine confers a high degree of immunity to artificial infection with a virulent strain. In children aged $1^1/_2$–$9^1/_2$, after vaccination the attack-rate of paralytic poliomyelitis in the 1956–57 season was a fifth of that in unvaccinated children. Live attenuated poliomyelitis vaccines are being tried: so far they have been trouble-free, but the antibody response has not always been satisfactory.

1. Report of the Medical Research Council for the year 1955–56. H.M. Stationery Office. Pp. 247. 9*s*.
2. See *Lancet*, 1956, i, 949.

In experimental *filarial infections* it was found that microfilariæ remained in the lung capillaries during the day, and were more generally distributed in the circulating blood at night. The antifilarial drug diethylcarbamazine ('Banocide') acts similarly to an opsonin, and is effective in the blood-stream but less so in places inaccessible to the phagocytes. The drug is most useful in the mass treatment of communities. Species of wuchereria similar to the human type have been found in animals, and several species of mosquito are now known to be involved as vectors. The response of onchocerciasis to chemotherapy is not satisfactory, but control of the simulium fly vector by dicophane (D.D.T.) has been successful.

The importance of the *kidney* in regulating the water and electrolyte content of the body is agreed, but attempts to compare the efficiency of the kidney in adults and in children have been frustrated by lack of an agreed basis for comparison—the body-weight, body-surface area, and body-water content give differing results. But by most criteria the kidneys of infants (human and rat) are less efficient than those of adults. Happily a balanced diet and the requirements of growth (which dictate that little protein be broken down) ensure that, normally, not too much material is presented for excretion.

Investigation of the nature of the difference between *normal and sickle-cell hæmoglobins* has shown that the only chemical difference lies in one peptide, which bears a positive charge in sickle-cell hæmoglobin at pH 6·4 but is unchanged in normal hæmoglobin; this difference is due to the presence of a valine molecule in the charged peptide and a glutamic-acid molecule in the neutral peptide. This is the first time that the effects of a single mutation on the chemical structure of a protein have been elucidated. When the sickle-cell-hæmoglobin molecules lose oxygen they may form fibrillar aggregates which attract one another into a parallel orientation, distorting the cell. In homozygotes the illness is severe, and four-fifths of them die before reaching reproductive age; the persistent high incidence of sickling in some African tribes is thought to be due to the high resistance of heterozygotes to malignant tertian malaria, which largely compensates for the lethality of sickling. In malaria-free regions (e.g., the United States) the prevalence of sickle-cell trait has fallen, as would be expected. Heterozygotes carrying a thalassæmic factor may be similarly resistant to malaria. Mutations of the kind, where genes are beneficial in one situation and harmful in another, are important in evolution.

Microbial genetics is briefly discussed. There are 3 mechanisms for the transfer of bacterial genes from cell to cell:

(1) Transformation operates in, e.g., pneumococci. If deoxyribonucleic acid (D.N.A.) is extracted from one strain and added to another, the recipient strain takes on some characteristics of the donor.

(2) Transduction operates in, e.g., salmonella. When virus multiplies in a donor cell, some chromosome fragments become incorporated in the virus, and may be integrated into the chromosomes of new infected cells which survive.

(3) Conjugation operates in, e.g., the colon bacillus. During temporary fusion of two cells, chromosome material passes from one to the other.

A bacterial virus acts by attaching itself to the bacterial cell and injecting its D.N.A., which then takes control of the host's synthesising mechanisms, causing them to produce more virus D.N.A. and protein. Often bacteria become permanently infected ("lysogenic") with a phage virus, and able to transmit it to their progeny. Some bacterial properties (e.g., toxin-production by diphtheria bacilli) are impossible except by lysogenic organisms.

Homografts are normally destroyed (except for blood, whose cells have no nuclei, and cornea, which has no

blood-supply). This does not apply to grafts between identical twins or members of an inbred strain, and the power to destroy grafts may be lost after irradiation. Irradiated mice, which would have been expected to die after a week or two, recover when inoculated with marrow. It has been shown that the homologous marrow actually colonises the irradiated host. Even grafts from another species (rat) may survive. Leukæmic mice have been successfully treated by irradiation heavy enough to destroy all the blood-forming tissue, followed by a marrow graft from a normal animal. Another means of making homografting possible is to inject tissue from another animal before birth; after reaching maturity the recipient will tolerate further grafts from the donor.

Other articles deal with the relationship between radiation and leukæmia, whooping-cough vaccines, protein turnover in tissues, the chemistry of proteins and peptides and of antibiotics, and mass-spectrometry in gas analysis. The summary of work indicates the vast range of the council's activities—from hypogammaglobulinæmia to possible carcinogenic action of detergents. The list of publications is as long and impressive as ever.

Before Our Time

TOBACCO FASHIONS

WHEN the natives of North America discovered the Europeans in the 15th century they introduced them to the pleasures of tobacco—snuffed, chewed, and smoked. The form in which it was used in their society was probably governed to some extent by custom and fashion; and pipe-smoking certainly had some religious and symbolic meanings. The history of tobacco-taking in Europe has also been strongly influenced by fashion, which, although partly shaped by authority, propaganda, and economics, owes much more to individual desires for novelty, distinction, emulation, and uniformity.

In England pipe-smoking became the fashion of the rich in the late 16th century, and, as the price of tobacco fell, the habit spread to all classes, both sexes, and almost all ages; by the turn of the century it was a national pastime. On the Continent, on the other hand, the fashion was for snuffing. There was, of course, much opposition to all forms of tobacco using; and the first important book against it—the opinions of sundry learned physicians—was published as early as 1598. Two Papal Bulls proclaimed excommunication for being found guilty of using tobacco in the churches of Seville and within the walls of St. Peter's in Rome. The Greek Church forbade its use entirely; and in Turkey, Persia, and India the death penalty was prescribed. A Russian tsar decreed that for the first offence the culprit should be whipped and for the second executed, while snuff-takers were to have their noses cut off; and Louis XIII of France prohibited its use unless ordered by a physician. In England, James I imposed a heavy import tax in 1604 and published his renowned Counterblaste with its bitter invective against the habit. But the fashion grew. Then, in the early years of the 18th century, it changed rapidly and there appears to have been no organised propaganda, legislation, or economic circumstance to account for this. In the time of the Stuarts, according to Sir William Besant, "the use of tobacco penetrated all ranks and classes of society. The grave divine, the soldier, the lawyer, the gallant about town, the merchant, the craftsman, the 'prentice, all used pipes. . . . People went to bed with tobacco box and pipe and candle on a table by the bedside . . . it is even stated that the very children in school took a pipe of tobacco instead of breakfast . . ." But by the end of Queen Anne's reign the pipe had been deposed and the English were well set for a century of snuff-taking.

Snuffing was already popular among all classes in France and in Scotland and Ireland. It seems probable that in England it grew up slowly among the "young bloods" as a protest against the excess to which smoking had been carried by the "lower orders." They imported the habit and the elegant ritual of snuff-taking from the fashionable French with the fastidious attention to blend and perfume, the exquisite snuff-boxes, the tap on the lid and the delicate lifting of the pinch to the nose, the inaudible inhalation and elaborate gestures of the hands and dainty handkerchiefs. These affections, of course, were scorned by men such as Samuel Johnson who carried their snuff loose in their waistcoat pockets; but schools of etiquette gave instruction, as an advertisement of 1711 states, in "the exercise of the Snuff-box, according to the most fashionable Airs and Notions . . . with the best plain and scented snuff." An accident of war may have contributed to the rapid spread of the habit. In 1702 50 tons of fine Havana snuff captured in Spanish ships were distributed among the English seamen as perquisites. They sold it cheaply in England and flooded the market in the southern counties with excellent snuff at 3*d*. or 4*d*. a pound. By 1720 a contemporary writer was able to say: "The world has taken up a ridiculous fashion—the excessive use of snuff. All nations are snuffing. All classes snuff, from the highest to the lowest. . . . Both sexes snuff, for the fashion has spread to women; the ladies began it and it is now imitated by the washerwomen." Dr. Johnson, fifty years later, remarked that "smoking has gone out. To be sure, it is a shocking thing, blowing smoke out of our mouths into other people's mouths, eyes and noses . . . yet I cannot account why a thing that requires so little exertion, and yet preserves the mind from total vacuity, should have gone out." According to Swift, the makers of snuff employed "by far the greatest number of hands of any manufacture of the kingdom." A snuff house was opened in the Haymarket in 1720 that has continued to blend and sell snuff without interruption to the present day. The ledgers and records provide an interesting history of fashions in the use of tobacco over more than 200 years. Queen Charlotte—nicknamed "snuffy Charlotte"—was a heavy snuff-taker and regular customer. Like many others she bought snuff by the pound, on Feb. 20, 1804, ordering 12 lb. of "Marrocca" at 8*s*. 6*d*. a pound with 4*s*. for a "jar and bung" and another 6 lb. on May 26. But by this time the craze of snuffing was waning. The mass of the people, among whom pipe-smoking had never lost its appeal, were slowly discarding the snuff habit; and cigars were becoming more popular among the rich. Snuff remained highly fashionable in the foppish circles in which the craze had originated. Indeed, it reached a peak of fashionable excess in the time of the Prince Regent and Beau Brummell.

By the middle of the 19th century the famous Haymarket shop was supplying as many smokers as snuffers, and in 1859 a work on the habits of "grand society" recorded that the obsolete custom of snuffing was "retained only by a few old gentlemen." The birth of cigar-smoking has been attributed to the Peninsular war, when the soldiers acquired a taste for Spanish cigars. The rise of cigarette-smoking has been linked with the Crimean war and contact with the customs of the Turks and Russians. It may be significant that the snuff craze began about the time of the extended war of the Spanish succession on the Continent. But changes of fashion are not caused by single circumstances or events, though these may precipitate a change when the communal taste is ready for one. Both the sudden fashion of snuffing in the 18th century and the

slower return to smoking in the 19th century followed periods when the habit had risen in quantity and quality to new heights of extravagance. It may be that the people were satiated with the monotony of one craze and ripe for the titillating novelty of another.

In the history of tobacco up to the appearance of cigarettes there is little evidence that the fashions were greatly influenced by the efforts of the tobacco trade. In the second half of the 19th century, however, tobacco advertising and intense competition for markets, together with increased production from the invention of the cigarette-making machine in 1880, undoubtedly influenced the fashion of smoking. In the past forty years the cigarette craze has blossomed as the pipe and the snuff crazes did before it. Changes of fashion can still happen without prompting: in the past ten years snuff sales in this country have been slowly but steadily rising without the aid of advertisement or preferential tax. The national fashion of ubiquitous cigarette-smoking may perhaps be reaching the limit of tolerable extravagance and be becoming ripe for decline.

Occasional Survey

SUBDURAL HÆMATOMA

THE first report on a traumatic subdural hæmatoma is probably that of Ambroise Paré.[1] He described the necropsy findings in King Henry II of France, who died in 1559 eleven days after being injured by a lance:

"His skull being opened after his death there was a great deal of blood found between the dura and pia mater poured forth in the part opposite to the blow at the middle of the suture of the hind part of the head and there appeared signs by the native colour turned yellow that the substance of the brain was corrupted as much as one might cover with one's thumb."

Many reports of subdural accumulations of blood, or bloodstained fluid, were published in the following three centuries. In these a traumatic origin was usually assumed. But in 1857 Virchow [2] introduced the name "pachymeningitis hæmorrhagica interna." He emphasised the intradural origin of the chronic hæmatoma and its inflammatory character. Others (e.g., Huguenin [3]) postulated a traumatic origin for all hæmorrhagic effusions on the inner aspect of the dura mater. About the turn of the century Jores and his pupils [4–6] emphasised the need for examining membranes spread out flat, and sections of the dura cut in two directions at 90° and taken from various parts. They advocated that two conditions should be distinguished—i.e., traumatic subdural hæmatoma, and pachymeningitis hæmorrhagica interna (which might show either degenerative changes and vasoproliferation or fibrinous exudation and cellular infiltration). Aschoff [7] considered that the striking capillary proliferation, in the absence of fibrinous exudation, and cellular infiltration were not inflammatory in origin, and proposed the name "pachymeningosis hæmorrhagica interna." Changes in the collagenous fibres of the subdural membranes, the appearance of cystic spaces, the spread of fibroblastic proliferation, and vascular proliferation had been described by G. M. Robertson,[8] and by Ford Robertson,[9] who quoted Wilks and Sperling's finding of membrane-formation after experimental injection of blood into the subdural space. Fahr [10] and Wohlwill [11] gave excellent accounts of the histological findings in pachymeningitis hæmorrhagica interna, and emphasised the capillary and endothelial proliferation in the absence of fibrinous exudate and without signs of organisation. The formation of wide engorged "giant capillaries" in the areolar layer of dura mater was generally recognised, particularly by Ostertag,[12] who studied the histology of pachymeningitis in whooping-cough. Albertini [13] came to conclusions similar to those of Jores and Laurent.

In the United States, Putnam and Cushing [14] and Putnam and Putnam [15] claimed that the traumatic and the spontaneous forms showed histological differences. Baker [16] pointed out that the larger hæmorrhages took place in the inner capillary bed of the dura mater and dissected along the loose connective tissue of the submesothelial layer; he considered trauma an important cause but not the only one. But in general the unitarian traumatic theory was readily accepted, particularly when Gardner [17] and Putnam [18] put forward an attractive hypothesis to explain the symptomless interval and the gradual increase in size of a subdural hæmorrhagic cyst. Zollinger and Gross [19] supported the hypothesis by model-experiments. They assumed that the membrane enclosing a subdural hæmatoma is semipermeable and that the proteins which arise from the disintegrating erythrocytes exert a colloid-osmotic pressure attracting fluids with low protein content, such as cerebrospinal fluid and possibly interstitial fluid of the dura mater. This is certainly a better explanation than repeated bleeding between laminated neomembranes, because, though the concentration of proteins in such a "blood cyst" is high, it is lower than that of blood, indicating a dilution with protein-free fluid.[19] The same pathogenesis was accepted for the pachymeningitis hæmorrhagica of infants, and the alternative name "chronic subdural hæmatoma" became popular.[20–23] Birth injury or insignificant, often overlooked, postnatal trauma were held to be the cause of the disorder.

Two thorough investigations on a very large material have lately been published. Link and Schleussing [24] studied the necropsy and histological findings from 941 patients aged over 16. They, like Gellerstedt,[25] separate sharply the traumatic subdural hæmatoma from true pachymeningitis hæmorrhagica. They believe that the fate of a post-traumatic hæmatoma depends on its size. Thus small hæmatomas are completely absorbed, leaving only hæmosiderotic pigmentation on the inner aspect of the dura mater; and larger ones result in rusty, brown, or brownish-grey thin neomembranes or pseudomembranes (often erroneously called pachymeningitic membranes). The largest are organised like hæmatomas in any other part of the body, beginning with fibroblastic proliferation and capillary budding in the inner areolar layer of the

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10. Fahr, T. *Zbl. allg. Path. path. Anat.* 1912, **23**, 977.
11. Wohlwill, F. *Virchows Arch.* 1913, **214**, 388.
12. Ostertag, B. *Ibid*, 1925, **255**, 129.
13. Albertini, A. v. *Schw. Z. allg. Path.* 1941, **4**, 442.
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16. Baker, A. B. *Arch. Path. (Lab. Med.)*, 1938, **26**, 535.
17. Gardner, W. J. *Arch. Neurol. Psychiat., Chicago*, 1932, **27**, 847.
18. Putnam, T. J. *Ibid*, p. 856.
19. Zollinger, R., Gross, R. E. *J. Amer. med. Ass.* 1934, **103**, 245.
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23. Korwitz, H. L. *Virchows Arch.* 1914, **215**, 233.
24. Link, K., Schleussing, H. *In* Lubarsch, Henke, and Rössle's Handbuch der pathologische, Anatomieund Histologie. Berlin, 1955; vol. 13/3.
25. Gellerstedt, N. *Ibid.* Berlin, 1956; vol. 13/4.

dura mater; the end-result is focal thickening of the dura mater—a dural scar. In the intermediate stage, clefts sometimes appear, either naked or lined by fibroblasts which may resemble a mesothelial lining; but usually such clefts are the result of shrinkage or even post-mortem artefacts. Wide spaces, when seen in spread-out membranes or sections parallel to the dural surface, communicate with each other, and cysts with one or many locules are exceptional. Hæmosiderin-laden macrophages may be seen in any of the stages, and in the milder forms of subdural hæmatoma. Extracellular hæmosiderin granules are rarer.

In true pachymeningitis hæmorrhagica the process starts as serous imbibition of the dura mater, swelling of collagenous fibres, and proliferation of vascular adventitia with accumulation of pigmented histiocytes. This is followed by larger intradural hæmorrhages which spread in the plane of the dura, and lead to the formation of neomembranes; finally a dural blood-sac is formed. There is little or no evidence of organisation. The capillary proliferation in the areolar layer of dura mater with the formation of giant capillaries is conspicuous though not absolutely characteristic. In addition to the vasoproliferative form of pachymeningitis hæmorrhagica—for which Aschoff's designation "pachymeningosis hæmorrhagica" is probably more appropriate—there are (as Jores and Laurent pointed out) cases with primarily fibrinous or fibrino-hæmorrhagic exudation and much cellular infiltration. In a few cases only it seems that a primary intradural hæmorrhage associated with a subdural hæmatoma leads to a chronic pachymeningitis hæmorrhagica. In the clinical history of patients with pachymeningitis hæmorrhagica, trauma is absent or insignificant.

At first sight it seems surprising that the dispute could go on for a hundred years, but most of the workers had only one type of material. Moreover, the difficulty in the interpretation of histological findings in dural or subdural lesions can be well understood from the account by Russel and Cairns [26] of their investigation of 4 cases of metastatic neoplastic infiltration of the veins in the dense layer of dura mater. This obstruction resulted in engorgement and rupture of the blood-vessels in the inner layer and bleeding not only into the areolar tissue but also into the subdural space. Thus a pathological process primarily located in the dura mater gave rise to a subdural hæmatoma. As Hamperl [27] says, subdural hæmorrhage and chronic pachymeningitis may lead to almost indistinguishable end-results, but it would be a mistake to consider them as identical disorders from the beginning.

FINDINGS IN INFANTS

Unfortunately all the cases of Link and Schleussing, and nearly all Gellerstedt's, were in adults. In many regards findings in infants are illuminating. Acute subdural hæmorrhage as the result of birth injury has been described.[28 29] It is seen mainly in full-term and post-mature infants, either in forceps delivery or with a disproportion between the size of the head and that of the birth canal. It is due to bitemporal compression with elongation of the falx cerebri and pull on the tentorium. At the same time the parietal squamæ overlap, one usually being shifted anteriorly over the other. This results in kinking and often rupture of the pial veins as they pass from the arachnoid through the subdural space into the superior longitudinal sinus.[30] Possibly in some cases the "bridging veins" (which cross the subdural space into the dura outside the sinuses in about a third of the population) are the source of hæmorrhage. From this description it is understandable that the subdural hæmatoma of the newborn is almost always associated with tears in the upper layer of the tentorium (usually near to the margins of the incisura tentorii) and with a layer of blood on the upper tentorial surface. Blood may or may not leak into the infratentorial space. By gravity, the blood accumulates in the posterior (temporo-parieto-occipital) regions. At necropsy the subdural hæmatoma may either cover the whole vertex or be localised in the posterior regions. If the hæmatoma is not immediately fatal, the common outcome is complete absorption leaving only rusty, reddish-brown spots on the inner aspect of the dura mater in the temporo-parieto-occipital regions, on the upper aspect of the tentorium and usually also in the middle cranial fossa. Contrary to some opinions, absorption does take place from the subdural space, and there is a rich network of lymphatics in the outer subperiosteal layer of the dura mater.[31 32] Usually the residua of neonatal subdural hæmatoma are incidental findings or the infants are admitted to hospital with feeding difficulties. When infants with moderate subdural hæmatoma die in the neonatal period from other causes, a few reddish-brown, thin, neomembranes like spiders' webs may be found in the same place.

Subdural hæmorrhagic effusions in premature newborn infants are different in nature. They arise from rupture of the distended arachnoid; enormous amounts of thin hæmorrhagic fluid, which have accumulated in the subarachnoid space, pour into the subdural space. If not fatal immediately, such hæmorrhagic effusions are absorbed without residua.

Another form of subdural hæmorrhagic effusion of which the mechanism can be clearly understood is that associated with diffuse atrophy of the brain. In children this is usually Tay-Sachs idiocy [33] or Alpers's disease (progressive diffuse degeneration of cerebral grey matter).[34] If the infant survives for some time, neomembranes are seen on the inner aspect of the dura mater over the whole vertex, and there is a patchy thickening of dura mater which may involve the walls of the dural sinuses (mainly the superior longitudinal) leading to stenosis and eventually thrombosis. Here the obvious explanation is the pressure difference and effusion *e vacuo*.

Entirely different in clinical aspects and localisation, and often difficult to interpret in histological findings, is the pachymeningitis hæmorrhagica interna of infants.[35–38] The disease is seen mainly between the fourth and eighth months of life. The infants are usually underweight, sometimes suffering from diarrhœa and occasionally from scurvy or a hæmorrhagic nasal discharge. The illness is usually chronic, starting with a slow enlargement of the head. The enlargement is usually uniform and globoid, unlike that seen in internal hydrocephalus. The fontanelle is bulging. Vomiting, crying, and somnolence are common. The infants may develop a hydrocephalic facies with the eyes directed downwards. Retinal hæmorrhages are the rule in these children, though rare in the pachymeningitis of adults. Occasionally the onset is acute, or even fulminating with symptoms like those of acute purulent meningitis; in some of these cases the acute symptoms subside, and the illness takes the chronic form. At necropsy the lesions are typically fronto-parietal and almost always bilateral. A subdural tap in the

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27. Hamperl, H. Lehrbuch der Allgemeinen Pathologie und der Pathologischen Anatomie. Berlin, 1950; p. 406.
28. Benecke, R. *Münch. med. Wschr.* 1910. **57**, 2125.
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32. Rusznyák, L., Földi, M., Szabó, G. Physiologie und Pathologie des Lymphkreislaufes. Budapest, 1957.
33. Ford, F. R. Diseases of the Nervous System in Infancy, Childhood and Adolescence. Springfield, Ill., 1945; p. 918.
34. Baar, H. S., McMenemey, W. H., Smallwood, W. C. Unpublished.
35. Finkelstein, H. *Jb. Kinderheilk.* 1911, **74**, 451.
36. Rosenberg, O. *Berl. klin. Wschr.* 1913, **50**, 2272.
37. Rosenberg, O. *Ergebn. inn. Med. Kinderheilk.* 1921, **20**, 549.
38. Eckstein, A. *In* Handbuch der Kinderheilkunde. Edited by M. von Pfaundler and A. Schlossman. Berlin, 1931; vol. 4, p. 557.

lateral angle of the fontanelle is therefore almost always successful, though it is not in the subdural hæmatoma of the newborn. Cysts are found with one or many locules filled with a hæmorrhagic and xanthochromic fluid, and thin reddish-brown membranes on either aspect of the sac. The dura is seen to be altered on histological examination. There are wide capillaries in the areolar layer, though "giant capillaries" are not as conspicuous as in pachymeningitis of the adult. Occasionally the condition is associated with internal hydrocephalus. Pigmentation of the dura in the temporo-occipital regions and on the upper aspect of the tentorium is rare, and pachymeningitic cysts are not seen on the upper lamina of the tentorium, where in birth injury tears are common. These findings, together with the clinical course and symptoms, exclude birth injury with subdural hæmatoma as the origin of this disease. It is very unlikely that it is caused by traumatic intradural hæmorrhage. Such hæmatomas are extremely common between the two dural layers of the tentorium; they are harmless and resorbed without any residual changes; but in sites where hæmorrhagic pachymeningitis is common they are practically never seen in infants dying from birth injury in the first few days of life. It is noteworthy that scurvy (in which an alteration of the ground substances of connective tissue is well known) is fairly commonly associated with pachymeningitis; but no association with hæmorrhagic disorders has been found. Walthard [39] has reported a capillary proliferation close to the inner aspect of the dura, similar to that seen in pachymeningitis hæmorrhagica, in laboratory animals on diets deficient in vitamin B_1. The high incidence of alcoholism in pachymeningitis hæmorrhagica of adults may be related to this. Various causes may lead to degenerative, vasoproliferative, and inflammatory changes in the areolar layer of the dura mater and thus to pachymeningitis hæmorrhagica interna.

TREATMENT

In treatment, the surgical approach described by Ingraham and Matson [21 22] seems to be the method of choice when there are appreciable amounts of clotted blood in the subdural space. For pachymeningitis hæmorrhagica interna with cysts which grow slowly in size, conservative treatment will be preferred by most pædiatricians. Beneficial results, with absorption of fluid, were reported [40–42] after aspirations of subdural fluid in addition to administration of antibiotics or vitamins, or both. Freislederer and Schweier [43] have now reported encouraging results using hyaluronidase in infants with verified pachymeningitis hæmorrhagica. This enzyme, one of the spreading factors, is known to catalyse the depolymerisation of mucopolysaccharides of ground substances, to increase the permeability of capillaries [44] and fascial membranes,[45] and to facilitate the absorption of subcutaneous fluid.[46 47] Accepting the theory of Gardner [17] and others, Freislederer and Schweier injected hyaluronidase into the dural sacs expecting to alter the physico-chemical properties of the semi-permeable membranes and promote a rapid absorption of the encysted fluid. They treated in this way 9 infants aged $3^1/_2$–12 months. In all of them the pachymeningitic cysts disappeared, and all gained in weight.

H. S. B.

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45. Day, T. *J. Physiol.* 1952, **117**, 1.
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In England Now

A Running Commentary by Peripatetic Correspondents

NOT for me sightseeing in Europe, cruising in cargo boats, or even sampling Spanish food. For 14 carefree, phoneless days I forgot I was a G.P. and along with a dozen others became a budding artist. We assembled at Rock on the North Cornish coast and, from a comfortable hotel, sallied forth daily, our Irish tutor in tow, to paint the coast-line if not exactly red most other colours. Budding artists are a mixed bunch, and we ranged in age from Arthur, aged 74, who painted exquisite water-colours during the day, at night regaling us with cups of tea, and Betsy, just starting in oils and the proud possessor of four grandchildren and a bubble-car, to George, Ruth, and Mary in their early 20s who came because they loved a painting holiday. We took our work seriously and our day began about 9.20 when the elder members of the party did their daily dozen by sprinting for the bus whose time of departure was as variable as an English summer. We painted till lunch with Paddy, our tutor, who swore he could teach anyone to paint, instructing, extolling, and encouraging all in turn. We painted till tea and if we wished we painted till dinner, and the sun still shone. Almost before we knew we had started the holiday was over. Between us we had produced getting on for 150 pictures. We may not all reach exhibition standard, but by the end of that fortnight we discovered a new way of expressing ourselves which though by no means perfect gave infinite pleasure to the doer. And miraculously Paddy was right. WE COULD PAINT.

* * *

Hallo, Sarah. Take a seat. How can I help you?

Aren't you busy, doctor! I've been waitin' for an hour and your room is still full . . . but I won't keep you long; I said to Nelly "'e's got enough to do." But she said "Get yourself along or I'll call 'im round." So I come right over from work . . . you'll excuse my workin' clothes. Well it's this 'ere. For a long time when I've been walkin' I get a little . . .

A little maizy?

No, I wouldn't say maizy. It's all down this side, an' I get a . . .

A pain?

No, its not a pain.

More of an ache?

You wouldn't rightly call it an ache. It strikes 'ere then it travels 'ere an' strikes through to the back an' up my neck an' leaves me feelin' cold an' 'ot.

Cold or hot?

Cold *an'* 'ot . . . if you know what I mean; an' then of course my bowels don't improve.

Still stubborn?

Just the other way!

Oh. Well I can give you something for that.

Are you writin' somethin' out for diarrhœa?

Well . . . yes.

But it's not the diarrhœa I've got . . . not really. I can be that way one day an' just the other the next. That's what I was tellin' our Nelly. I said "It's not natural. There's somethin' sadly wrong," I said. So I come right over. Do you remember them pills you gave me?

Er . . . the white ones?

No, the red.

I don't seem to have written them down. When did I prescribe them?

I met you in the market one day an' you 'ad your scripts with you an' you wrote me down for a course of 'em an' said they was just what I needed.

Of course. Of course. You were run down . . .

That's it.

A bit anæmic . . . and a bit chesty?

Yes, I was.

And your stomach was off?

That's right. I was tellin' Mr. Hudson the butcher about my wind just before you came along.

Yes I remember, Sarah. And you were hot and cold and faint and sick. You can have some more with pleasure.

I was just goin' to say, doctor . . .

How many do you want, Sarah? 50? 100?

I was just goin' to say, doctor . . .

I'll give you 100; it will keep you well-stocked. No use making extra journeys to the surgery. You are busy enough I am sure.

I was just goin' to say, doctor . . .

Yes, Sarah ?

Are you givin' me a recipe for them tablets . . . the same ones ?

I am indeed . . . exactly the same . . . er . . . that's what you want isn't it ?

No please, doctor. They were very good but they made me sick an' they didn't really relieve the . . .

The pain ?

Well you wouldn't call it a pain . . .

* * *

My friend has an inbred politeness which makes him unable to assert himself in small matters. His wife and he were at a London theatre and, just before the play started, his nose began to bleed. His technique, developed over the years, is not to fuss but hold his head over a basin and soon the bleeding stops. When he felt it coming on he accordingly left his seat and proceeded to a wash-basin. There the dripping went on as usual and was beginning to get less when a voice behind him said "Ah! a nose-bleed. I'm a doctor. I'll stop that for you." My friend protested, probably a little at a disadvantage with head forward and having to be careful where he aimed the blood, that he was quite all right, was used to it, and that it would soon stop. The energetic doctor quickly returned with cotton-wool and despite spluttering protests proceeded to pack each nostril with what could have been an excess of therapeutic zeal, for when he had finished the patient said, in retrospect, he felt that his head was full of cotton-wool, and he felt faint. He asked if he could have a glass of brandy, a traditional syncopal remedy in which he had much faith, but the doctor said certainly not and that orange juice was the thing for him. Orange juice is anathema to this particular epistaxian, but having been shaken and probably speaking even more indistinctly he was unable to make this plain and at the point of the stethoscope he ingested a large glass of orange juice. The doctor disappeared.

My friend saw the play without pleasure, being more concerned, he says, with his endogenous throbbings in the head than the emotional ones on the stage. When he returned home that night he couldn't remove the cotton-wool which had been well and truly packed and being a considerate person sat with his head in his hands all night because of his discomfort before calling his own doctor in the morning.

* * *

In the routine history I asked: "Do you ever get short of breath ?"

"Only since I've been doing my present job."

"And what is that ?"

"Carrying gas cookers."

"Oh. Well, how many stairs can you climb before you get breathless ?"

"Oo, carrying a gas cooker, only about three flights."

* * *

My patient, an elderly lady with a broken hip, shares a room in hospital with a younger lady who has recently undergone pelvic surgery. Weaning the latter from her catheter has been difficult and two days ago her doctor tried hypnotic suggestion. She still has her catheter. But *my* patient complains that she should have been given ear-plugs—she has had frequency ever since.

* * *

I had some difficulty in making my American friend understand how to get to his destination.

"You take the left fork at the doss-house," I explained.

"What is a doss-house ?"

"A doss-house is a place where tramps put up for a night."

"What is a tramp ?"

"A vagrant, a vagabond, wayfarer, loafer . . ."

He looked at me blankly.

"A hoofer, a hobo, someone dressed in old clothes with a straggly beard who lives on the road," I continued desperately.

"Now I get you," he exclaimed at last. "You mean a bum."

* * *

Science Fiction Footnote.—He chemotaxied towards her and took her in his arms.

Letters to the Editor

CONSULTANT AND SPECIALIST

SIR,—Your article and leader of June 1 are well timed and should instil a sense of urgency into those responsible for our hospital services.

Stated simply, the problem is that our present hospital provision does not meet the needs of outpatient consultation and investigation or inpatient treatment. There are nearly 500,000 people on our waiting-lists; patients and practitioners weary of waiting for outpatient consultations, and senior registrars, trained to deal with this situation, are unable to find a satisfying outlet.

There is a great disparity of consultant distribution throughout the country—the facts are known, but not published. You, Sir, must have obtained some insight into these in your recent partial survey. The Ministry will not reveal the recommendations made by working parties of senior consultants in each region some five years ago and the Consultants and Specialists Committee does not appear to have been very insistent in demanding this information. In many areas there is known to be resistance by the profession to the appointment of more consultants. Our traumatic service cannot deal adequately with a rising accident-rate, but the resistance to proposals for remedying this is mainly medical.

The situation is urgent. Many in the profession feel unable to voice their opinions openly. Consultants, in part, because the system by which merit awards are made discourages outspokenness, while senior registrars and their juniors obviously cannot put themselves in a position which diminishes still further their meagre chance of promotion.

There is need for change and this can only come from outside the present administration. General-practitioner distribution is being ensured by statutory means. It is essential for Parliament to set up a committee forthwith to obtain the facts, so carefully guarded, and to make recommendations for immediate implementation.

This would ensure that "waiting" is not regarded as normal for our hospital population and that senior registrars get the consultant appointments for which they have been trained.

Central Middlesex Hospital,
London, N.W.10. HORACE JOULES.

SIR,—Your leader (June 1) and the correspondence arising from it have been headed Consultant and Specialist. It may be that at least some of our present discontents are linked with the circumstances which have caused this distinction to be created.

In the days before the National Health Service, a patient looked in the first place, for medical advice and help, to his personal or family doctor, who gradually, as a consequence of the rise of specialism, came to be known as a general practitioner. When this personal medical attendant felt that he needed a second opinion, he called in a specialist of his choice, with whom he went into consultation. This was a conference between practitioners who were regarded as collaborators, and it was the personal attendant, and not the second opinion, who took the responsibility for the action which ensued from the meeting. If the patient could afford to pay for the specialist's opinion, he was expected to do so, but if he could not, it was usual for him to go to a hospital or clinic at which the specialist gave his services freely, and as a consequence became known as an honorary surgeon or physician as the case might be. In some hospitals, each specialty might have more than one honorary accredited to it, and in such cases the senior honorary was designated accordingly. His juniors were specialists as he was, and in due time would probably step into his position. In the meantime, private consulting practice was open to the junior.

The point is that in that period a practitioner was called a specialist because he practised a specialty, and when the word consultant was applied to him, it carried no implication that other specialists were of lower rank or had need of his supervision, although it was open to them to consult with him in a particular case if they so wished.

With the advent of the health service, the word "honorary" was no longer appropriate, and since the specialists concerned saw only patients referred to them by general practitioners, they were given the title "consultant." At the same time it was realised that some hospitals, mostly of the long-stay type, were giving treatment which was appropriate to the needs of the patients but could not be considered the practice of a specialty, and in others the assistant medical officers were working under the immediate supervision of a medical superintendent, and as a purely temporary expedient the title "senior hospital medical officer" was coined for such officers. At that time the criterion was the nature of the work carried out by the holder of the post, not his personal qualities or academic attainments; in short, "the rate for the job," and it would be difficult to quarrel with this principle.

At that time the consultant appeared to be in line of succession to the pre-1948 honorary, and the S.H.M.O. was the successor of the hospital medical officer in the employ of local authorities and similar bodies, who provided treatment for patients who were in hospital for such long periods that they could no longer be regarded as being under the care of their own private or panel doctors.

In the Terms and Conditions of Service of Hospital Medical and Dental Staff, published on June 7, 1949, S.H.M.O.s were defined as "senior officers performing clinical duties who are not of consultant status but not registrars." At this point it became clear that the criterion which defined the S.H.M.O. was not the nature of the work but the assessment of the holder of the post. On Oct. 5, 1950, circular R.H.B. (50) 96 appeared, and it became clear that the S.H.M.O. was now to be regarded, not as a senior practitioner who worked in hospital, but as a grade of specialist beneath the rank of consultant, and therefore suitable to be an assistant grade which would have the function of extending specialist treatment to fields which the existing consultants were not sufficiently numerous to cover, but which could be said to have consultant cover by reason of the supervision which the consultant was presumed to exercise over the S.H.M.O. At this point it became clear that the original understanding—that the S.H.M.O. grade was a temporary one which would tend to die out as the National Health Service developed—had been dropped.

There is a widespread impression that it is proposed to perpetuate a species of subconsultant specialists in grade III of the Strachan proposals, at a rate in which the maximum would be comparable with the starting remuneration of the most junior consultant. It is difficult to imagine that any practitioner would accept this subordinate rôle as the summit of his ambitions. At present S.H.M.O.s constitute more than a third of the total specialist body, and if the impression is well founded, they might approach parity in numbers. The last paragraph of your editorial asserts that it is baseless to harbour a fear that the Ministry might ruthlessly seek to swell the ranks of specialists with the aim of securing cut-price consultants. Whether this is the Ministry's aim is irrelevant. It would be the logical outcome if this impression proves to be well founded.

Cambridge. C. B. V. WALKER.

SIR,—I should like to support Dr. Herford's views (June 15) which in many ways go to the rock bottom of our principal troubles in the National Health Service as it exists today.

If general practitioners had the time and the inclination to do for their patients *themselves* all the work for which they were trained, to accept continuous care for them under all circumstances and all conditions, whether of body or mind, from the time they come on their lists till they depart or die, if or when that becomes so, then *out*patient departments could become mere shadows of what they once were. Consultants and specialists could at long last have ample time to devote to those patients who were really in need of the services of a man of consultant rank, with consequent enormous saving in the administration.

With all due respect, Sir, I must entirely disagree with you when you suggest the appointment of assistant physicians and surgeons.

Having made a special study of the working of the National Health Service since its inception, I am convinced that you may have the finest hospital and specialist staff in the world; but if you have not got a first-class general-practitioner service as well you can no more wage a successful campaign against disease than can the general commanding an army in battle, who has been given a first-class team of experts to help him, but whose fighting troops are of poor quality.

Worthing HAROLD LEESON.

SEX DIFFERENCE IN GENETIC RISKS OF RADIATION

SIR,—Many authorities on radiogenetics, among whom Muller is one of the most prominent,[1–5] believe that increased radioactivity of the external medium, as a result of nuclear tests and of the peaceful utilisation of "heavy" nuclear energy, will prove detrimental to the future of the human race by unbalancing the ratio between the rate of mutations and the rate of eliminations.

It is highly regrettable that humanity should waste enormous amounts of technical skill, money, and fissile material in merely destructive fields. Let us hope that in not too remote a day, common agreement of the great nuclear powers will stop this nonsensical bomb race.

Nevertheless, the industrial use of atomic power faces humanity with serious problems, among which radioprotection is not the least important. I think that the present maximum permissible dose of ionising radiation (0·3r per week, which amounts to about 300–350r for the entire reproductive period of the human individual) is too high and needs urgent revision.

But the possible genetic damage from irradiation may not be equal in both sexes. From a close scrutiny of the biology of reproductive cells of both sexes, it seems probable that male gametes are not so liable as the ova to transmit acquired radio-induced mutation.

If we accept that the spontaneous mutation-rate found in mice is applicable to man, then one gene mutation per 40,000 gametes is likely to have little effect on the descendants,[6] since millions of spermatozoa are produced, and only one (and we may suppose it the best qualified one) is accepted by the ovum. A monogenic mutation is likely to be transmitted only if the vast majority of male gametes bear it. Rare monogenic or oligogenic mutations, of the kind produced by ionising radiations, are likely to affect the biology of the bearer in such a way as not to permit it to compete with its brother gametes.

On the other hand, the maturation-rate of spermatogonia and spermatocytes is so high that the accumulation of irradiation seems less perilous than for the female sex-cells. The production and elimination of the ova is a slow process, during which radiations have time to act. Only one ovum takes part in the act of reproduction.

1. Muller, H. J. *Acta radiol., Stockh.* 1954, **41**, 5.
2. Muller, H. J. *Science*, 1955, **121**, 837.
3. Muller, H. J. *J. hered.* 1955, **46**, 199.
4. Muller, H. J. *Bull. atom. scient.* 1955, **11**, 329.
5. Muller, H. J. *Sci. Amer.* 1955, **193**, 58.
6. Sturtevant, A. H. *Engng. Sci.* 1955, **18**, 9.

The rate of maturation is slow ; therefore the damage due to accumulation could be greater, and the dimensions of the cell make it a bigger target for ionising particles.

On the other hand, there is a well-known direct relationship between radiosensitivity and the metabolic state of the cell, and ovogenesis is a much slower process than spermogenesis ; but the ages of the cells are equal, and in the premeiotic stages their nuclei play similar rôles.

I think that women are more exposed to the genetic hazards of the increasing radioactivity of their surroundings and that there should be different standards for the maximum permissible dose of irradiation for each sex.

Laboratory Division, Dobrita Sanitarium, Craiova, Rumania. EUGEN J. ALTESCU.

RADIATION AND INFLUENZA MUTATION

SIR,—Mr. Pirie's suggestion (June 15) that the mutant strain of the influenza virus which is causing the present epidemic in the Far East may be the result of the nuclear-weapon tests in the Pacific is difficult to refute, if only because of the logical impossibility of proving a negative. It would be equally difficult for him to disprove that the mutation is not the consequence of any other cosmic event—e.g., the arrival of a particle of extremely high energy from outer space, such as has been recently reported from the Massachusetts Institute of Technology. We are therefore left with probabilities, and as it is notorious that the influenza virus is more liable to spontaneous mutation than almost any other virus, it would seem unnecessary to invoke any special circumstance to account for the appearance of this particular mutant strain.

The Eastern origin of the epidemic is by no means unique and cannot be attributed to any sinister effects of the weapon tests. Every schoolboy must know that the Black Death came from the East, and most practitioners are aware that the majority of the pestilences which have ravaged Europe in the past have originated in the East. There is much evidence which points to the East as the home of nearly all the infectious diseases which have afflicted and still afflict us.

London, W.1. E. J. MOYNAHAN.

THE CHILD'S RIGHT TO ADOPTION

SIR,—Miss Hunter's letter of June 15 raises some interesting points.

I would agree with her that there are a large number of unwanted legitimate children, but wonder very much why she thinks that to have these children adopted would solve the situation.

Psychologically the evidence would certainly not seem to support such a hypothesis. The crux of the children's emotional disturbance as evidenced by their behaviour disorders or neurotic or psychosomatic symptoms lies in the fact that they are not wanted by the parents who have them and one repeatedly finds that adopted children vent the insecurity which is the result of this situation on the adoptive parents and become their problem. This was clearly expressed by one such child who said : "The fact they loved me made me feel worse—why was I not loved by my own mother and father ? " It is often also true that the children vent the hate and aggression that really belongs to the rejecting natural parents against the adoptive ones, and try to force them to repeat the original situation.

In thinking of this problem, I would like to comment on another point. It seems to be assumed that all persons wanting to adopt children have "good" reasons for doing so and will make "good parents." Many of them, I would feel, in fact want them to appease their own sense of failure, and at once reject the child who does not fulfil their sometimes irrational demands for intellectual and social qualities that do them credit. Such people make bad parents ; but although great care is taken that adoptive parents shall be given "satisfactory children," less is taken that the children shall be given "satisfactory parents."

Department of Psychiatry, University of Leeds. W. MARY BURBURY.

CARDIAC ARREST WITH FLUOTHANE

SIR,—Since I have in preparation a report of 25 selected cases of cardiopulmonary disease, which include conditions such as congestive heart-failure and fulminating thyrotoxicosis, successfully anæsthetised with 'Fluothane' (halothane), I would like to comment on Dr. Foster's letter of June 1.

In my experience fluothane has proved entirely safe when used in concentrations of under 2%. Safety is increased by the use of an inhaler giving precise vapour percentages. The 'Fluotec' (Cyprane Ltd.), a temperature-regulated inhaler, delivers a vapour of from 0·5 to 3% at gas flows of 4 to 10 litres a minute. Concentrations of 0·5 to 0·8%, which do not materially affect blood-pressure or pulse-rate, are sufficient for all operations where muscular relaxation is not required, provided it is not intended deliberately to lower the blood-pressure. For operations in the pelvis or lower abdomen 1·2 to 1·5% produces sufficient muscular relaxation. This strength has not normally affected blood-pressure or pulse-rate to an extent necessitating intravenous atropine for bradycardia or methoxamine for hypotension, when hyperduric atropine has been used in premedication.

The safety factor has been carefully studied by Raventos in animal experiments.[1]

In dogs a vapour strength of 3·6% produced respiratory arrest in 60 min., but cardiac arrest did not occur for a further 9–10 min. In another experiment 4% vapour produced respiratory arrest in 9 min. Artificial respiration was continued for a further 90 min. at this concentration. This produced a decrease in voltage of Q R S T complex, but the heart continued to beat regularly.

Very precise control of vapour strength is essential in the use of fluothane. I think that Dr. Foster has probably been instrumental in preventing accidents with this drug and I should like to congratulate him on his frankness in reporting this case.

Crewe and District Memorial Hospital, Crewe. E. S. POPE.

SIR,—' Fluothane ' (halothane) is a potent anæsthetic agent and in my opinion a valuable addition to our armamentarium. Because it is so potent—2% or less of fluothane vapour sufficing for anæsthesia in the great majority of subjects, while 3% should not be exceeded —it is essential that it should be administered via an apparatus which enables one to control the strength of the mixture delicately and accurately. There is at least one inhaler on the market which does this : the ether bottle of the Boyle mark-2 circle absorber, which was designed to provide high concentrations of ether vapour, certainly does not.

In an attempt to reproduce in the laboratory a mixture similar to that used by Dr. Foster (June 1), I connected a sine-curve respiratory pump to a Boyle mark-2 circle absorber and adjusted it to give a stroke of 500 ml. sixteen times a minute. Just under 2 oz. of fluothane were placed in the ether bottle and the control turned to the sixth notch. Samples were drawn by suction from the facepiece end of a corrugated tube through a Rayleigh gas interference refractometer. In 60 sec. the concentration of fluothane rose to 11%, in 90 sec. to 13%, and in 2 min. to 15%.

When the experiment was repeated with 4 oz. of fluothane in the bottle the concentration rose to 12·8% after 60 sec. and to 15% after 90 sec. In clinical use the

1. *Brit. J. Pharmacol.* 1956, 11, 394.

warm expired gases would presumably result in even higher figures. These figures are some four to five times the maximum permissible clinical strength of 3%.

The Royal Infirmary, Manchester. H. J. BRENNAN.

ORGANIC DISEASE AND SUICIDE

SIR,—To the layman, and to many doctors, suicide is a matter of mental rather than physical disturbance. The customary verdict of the coroner's court is that the event took place "while the balance of the mind was disturbed," and this contributes to the exclusion of organic disease as a contributory factor.

As the coroner is concerned only with the mode of death and with the state of mind of the deceased, no report of organic disease present is made to the Registrar-General. Consequently, the only source of information about them is the file of the individual pathologist. My records over the past five years show 65 cases—a number which cannot be expected to provide accurate statistics, but will, perhaps, show that physical disease is important enough to warrant its inclusion in the coroner's certificate in many of the cases.

In the series there are three groups.

Group 1.—No organic disease (21 cases) (32%).

Group 2.—Organic disease which might initiate or enhance depression (19 cases) (29%).

(*a*) Arterial hypertension (12). In all there was massive hypertrophy of the left ventricle, the heart weights ranging from 16 to 31 oz. No valve defect was found. In 1 case there was an adrenal cortical adenoma 5 cm. in diameter.

(*b*) Active peptic ulcer (4). The presence of such lesions in persons who have not sought medical advice may, apart from the stress induced by pain, foster the belief that there is a cancer.

(*c*) Kümmell's disease (1). This man had had a severe crush fracture of the lower dorsal spine some years previously, and progressive collapse of the vertebræ led to his being bedridden, and in constant severe pain for many months.

(*d*) Recurrence of uterine prolapse (1). This patient, although in considerable discomfort, had declined to consider a further operation.

(*e*) Cerebral thrombosis with hemiplegia, immediately following an abdominal operation (1).

Group 3.—Organic disease possibly associated with depression (25 cases) (39%).

(*a*) Cholelithiasis (7). Of these, 5 had large gall-stones at necropsy, and 2 had recently had the gall-bladder excised for stone.

(*b*) Fatty infiltration of the heart (7). These showed a great excess of epicardial fat with penetration of the muscle of the right heart. Only 1 was grossly obese, and in the other 6 the condition appeared to be due to chronic bronchitis and emphysema. In all there was certainly a severe restriction of physical activity.

(*c*) Gross obesity (5). Advanced fatty degeneration of the liver was present in 1 case. Here again there was a severe restriction of physical activity. None of them could have walked upstairs without dyspnœa. (In all, in the whole series, there were 11 examples of gross obesity.)

(*d*) Thyroid disorders (nodular goitre 1, large adenomas 2). Apart from their toxic effects, these may have been interpreted as cancers.

(*e*) Enlarged prostate with hypertrophied bladder (1).

(*f*) Bilateral adrenal hypertrophy (1). The glands were about 5 times normal size.

(*g*) Chronic hypertrophic gastritis (1). This may of course have been due to the misuse of alcohol.

It may well be argued that there are large numbers of contented people with high blood-pressure, that fat and jolly men can be found everywhere, and that a considerable proportion of the population goes to the grave with gall-stones of which it has never been aware. But the parade of pathology in these 65 persons indicates that organic disease in suicide is a matter of some importance, and deserving of further consideration.

Victoria Hospital, Keighley, Yorks. IAN STEWART.

RELATIVES IN HOSPITAL

SIR,—In your leading article of May 11 you referred to the necessity of providing for visitors. Through the good offices of the former contributory scheme, it has been possible to provide, at this hospital, a hostel for patients' relatives. It is a modern bungalow and includes a double room, two single rooms, kitchenette, lounge, bathroom, and two toilets. Four people can stay overnight, and a larger number during the day in the spacious lounge. No meals are provided in the hostel. The relatives can obtain them either in the dining-rooms or in the staff canteen where they pay the normal charges.

Occupants of the hostel are expected to look after their rooms, to make their own beds, and generally to care for the place, though the cleaning services are provided by the hospital. Care is taken to ensure that the privileges are not abused, and when a ward sister is aware of a relative who genuinely needs accommodation the hostel is used. It is not intended to provide lodging free of charge where people are able to pay hotel charges, but in all deserving cases the services of the hostel are free.

A second use to which the building is put is to accommodate nursing mothers whose infants are patients of the hospital. Accommodation of these mothers has often in the past presented difficulty, even where, by arrangement, billets were available in the town. Through the use of the hostel these difficulties no longer exist.

Before the construction of the hostel, records showed the potential demand for such accommodation, and the forecast has been entirely justified by the experience gained since it was opened. It has been occupied constantly, and within six weeks was in full occupation, though, of course, this will not be continuous.

Lack of capital funds prohibit such provision from normal resources, but a scheme like this should be well within the target of most Leagues of Friends.

Royal Hampshire County Hospital, Winchester. FRANK REEVES
Group Secretary and Superintendent.

AN "OUTBREAK" OF CORONARY-ARTERY DISEASE

SIR,—Since the beginning of the year, we, in the course of our work as general practitioners, seem to have struck a very peculiar "epidemic," and we should be interested to learn whether any other doctor has had a similar experience.

About the middle of March it occurred to us that we were seeing an unprecedented number of cases of angina and coronary occlusion. The patients, many of whom up to then had rarely complained of any serious illness, had at some time in January suffered from an illness which we had labelled "influenza." They had complained of severe malaise ("feeling awful"), unusual tiredness, and occasionally sharp supra-orbital pain. They looked very ill, but had none of the aches and pains of true influenza. They had a brown furred tongue, a variable temperature, and a basal bronchiolitis, but nothing else. Seven to ten days later the picture changed to that of a very resistant bronchitis, and sometimes to a severe bronchopneumonia.

When they appeared to be recuperating, and even after apparent recovery, they began to complain either of retrosternal pain, radiating to the throat, or precordial pain, or pins and needles, radiating to the left shoulder and to the little finger, relieved by rest, and associated with temporary but striking fall in blood-pressure. In a few, a full coronary thrombosis developed. At this stage, through the kindness of the casualty officers of St. Bartholomew's Hospital, some electrocardiograms were done, and the reports often read: "The tracing is an unusual one of the S1, S2, S3 type." In some cases there was slight depression of the S-T segments in leads 2 and V6. Six had definite evidence of small cardiac infarcts. Three others died of coronary thrombosis.

In all cases, whether the patient developed cardiac symptoms or not, he sooner or later had signs or symptoms which we attributed to liver insufficiency—muddy complexion, flatulence, abdominal discomfort, and much hepatic tenderness, but no obvious jaundice, though the urine, with colour varying from orange to dark brown, gave positive froth and sulphur tests, and the stools were often pale; but both changes were transitory.

Still under the illusion that this was some obscure form of virus-A influenza, we approached the director of the Central Public Health Laboratory, Colindale, who very kindly investigated the bloods of about a dozen of these patients for a virus infection, but was unable to arrive at any definite conclusion.

Men and women were equally affected, sometimes more than one in a family. Most were over the age of 40. Those with a tendency to cardiovascular disorders seemed to be more readily affected and were often left with a varying degree of permanent damage. We have traced a few children whose bouts of peculiar malaise and unexplained pyrexia seem to us in retrospect to fit in with the same sequence of events.

Treatment consisted of salicylates and antibiotics in the acute stages, with symptomatic treatment later on.

In view of the seriousness of the sequelæ, we should like to know whether any other doctor has had a like experience, and whether anyone can offer an explanation of this "epidemic" of coronary-artery disease?

We should like to point out that in this district coronary and general arterial disorders are very common, and that one of us (J. Z.) has, in fact, been following up a series of cases of cardiovascular and hypertensive disease for the past eight years; hence the sudden appearance of an unusual number of acute cardiac cases was all the more striking.

J. ZEITLIN
A. MELINEK.

London, E.8.

CIRCUMCISION WITH BONE-CUTTERS

SIR,—I think it would be unfortunate if the advocacy by Mr. Skegg (June 8) and Mr. Crossling (June 22) of the bone-forceps technique for circumcision was allowed to pass without reference to a serious objection to the method—namely, the removal of an inadequate amount of the lining mucous membrane of the prepuce. The fusion of the residual mucous membrane, which is still able to cover the greater part of the glans penis, to the preputial skin is liable to be followed by a severe degree of postoperative phimosis and a revision of the circumcision may become necessary. The fear of this unfortunate and avoidable complication no doubt accounts for much of the unpopularity of the method in this country.

Leamington Spa,
Warwickshire.

C. R. SAVAGE.

TREATMENT OF MIGRAINE

SIR,—Without any desire to discuss the theories current about the cause of migraine, or indeed sufficient knowledge to enable me to do so, I nevertheless am led, after investigation of a sufferer in whom I take a deep interest, to mention one point for the benefit of those who, like most of us, have to treat patients in a symptomatic way—a point which does not seem to be sufficiently remembered.

In this patient, at the beginning of an attack, the pylorus shuts completely, so making the swallowing of drugs entirely useless, since they simply stay in the stomach until the attack is over. I should imagine that this condition is fairly common, judging from statements from other patients. If this is so, drugs taken by mouth might as well be thrown at once into whatever receptacle the patient seizes when vomiting starts, as it usually does.

For this patient nothing has been of any use in stopping an attack until he tried hypodermic injection of ergotamine tartrate or some of the barbiturates, which are useful sometimes as a change. Recently, however, a chlorophenothiazinyl - propyl - methyl - piperazine derivative ('Stemetil') has been advocated for the control of migraine. My patient finds it of no use when taken alone, but it does control vomiting, apparently by keeping the pylorus open, and he finds that four 5-mg. tablets with a 2-mg. tablet of ergotamine tartrate, if taken as soon as the premonitory feeling comes on, will stop an attack. If the attack has been allowed to develop further, as may sometimes happen when it starts during sleep, a second or third dose of both may be taken.

I intend to try the effect of following the stemetil by some of the more ordinary sedatives; but meanwhile I hope that this letter may help to relieve those who have frequent attacks of migraine.

I am very grateful to Dr. C. W. Walker, of Hereford, for bringing this drug to my notice.

Holme Lacy Hospital,
Hereford.

D. S. SPENCE.

CHRONIC LYMPHATIC LEUKÆMIA AND THE NEPHROTIC SYNDROME

SIR,—Dr. Bodley Scott (June 8) reported for the first time the association of the nephrotic syndrome in two patients suffering from chronic lymphatic leukæmia. Amyloidosis involving the kidneys was responsible for the syndrome in one of these patients. He recalls that amyloidosis is seen occasionally with myelomatosis and suggests that this forms another link between myelomatosis and chronic lymphatic leukæmia.

In the past twelve months I have seen two examples of the nephrotic syndrome due to amyloidosis—one occurring in association with chronic lymphatic leukæmia and the other with Hodgkin's disease.

CASE 1.—Six months before his death, a man of 47 was found to have an early form of chronic lymphatic leukæmia. Blood examination: Hb 13·1 g. per 100 ml., red cells 4,400,000 per c.mm., white cells 23,100 per c.mm. (polymorphs 47·5%, lymphocytes 46·5%, monocytes 5·5%, eosinophils 0·5%), platelets 271,000 per c.mm. The marrow showed a moderate increase in small mature lymphocytes. Serum protein: total 4·5, albumin 2·4, globulin 2·1 g. per 100 ml. Electrophoretic pattern of the protein showed no characteristic abnormality. No treatment was given for the leukæmia. A few weeks before death considerable œdema of the extremities and gross proteinuria developed.

Necropsy.—Considerable amyloidosis of liver (2450 g.) and spleen (510 g.), and smaller amounts in marrow, lymph-nodes, and suprarenals. Congenital absence of right kidney. Cystic disease and considerable amyloidosis of left kidney. Moderate leukæmic infiltration of liver, spleen, marrow, and lymph-nodes.

CASE 2.—Two years before death, a man of 29 complained of night sweats, anorexia, and loss of weight. There were no significant abnormal signs, and investigations failed to find a cause for the pyrexia. Eighteen months later he complained of low abdominal pain and a pelvic mass was palpable. Laparotomy revealed a mass of firm lymph-nodes encircling the left common iliac vessels. Histological examination of one of these nodes showed Hodgkin's disease. The blood and marrow pictures were normal. Serum protein: total 8·9, albumin 3·9, globulin 5·0 g. per 100 ml. Electrophoresis showed no demonstrable abnormality of the globulin fraction.

A total of 30 mg. of nitrogen mustard ('Trillekamin') was given intravenously, in five divided doses. Four months later severe anæmia, diarrhœa, and anorexia developed and there was further loss in weight. Peripheral œdema was extensive and there was a heavy proteinuria (Esbach, 20 g. per day). Serum protein: total 3·3, albumin 1·0, globulin 2·3 g. per 100 ml.

Necropsy.—Considerable amyloidosis of liver (3450 g.), spleen (280 g.), kidneys (340 g. each), and suprarenals. Hodgkin's disease of lymph-nodes and spleen.

Teilum [1] recorded the induction or enhancement of amyloidosis by nitrogen mustards, cortisone, and corticotrophin in mice treated with subcutaneous injections of sodium caseinate. Teilum believes that a suppression of mesenchymal cells which are in a state of active proliferation is involved in the basic mechanism of the formation of amyloid. This theory is further supported by reports of Hodgkin's disease in man treated by nitrogen mustard in which amyloidosis rapidly developed.[1 2]

In case 2, nitrogen mustards were given for the Hodgkin's disease and this was followed by amyloidosis.

1. Teilum, G. *J. Lab. clin. Med.* 1954, **43**, 367.
2. Spain, D. M. *Amer. J. clin. Path.* 1956, **26**, 52.

In case 1, however, no treatment was given which could account for the subsequent development of amyloidosis.

A hyperglobulinæmia is commonly found in many of the primary neoplastic diseases of the reticuloendothelial system—for example, myelomatosis, chronic lymphatic leukæmia, Hodgkin's disease, and the reticuloses. It is of considerable interest to know what proportion of these develop amyloidosis and whether treatment with nitrogen mustards, irradiation, cortisone, or corticotrophin was given.

Department of Pathology,
University of Manchester. B. J. LEONARD.

DIAGNOSIS OF ACUTE STAPHYLOCOCCAL ENTEROCOLITIS

SIR,—It was with great interest that we read the article by Dr. Matthias and his colleagues [1] in which they drew attention to a method of diagnosing acute staphylococcal enterocolitis.

We are glad that they have been able to confirm our findings [2] that a gram film made of the fæces is a test, both simple and rapid, that can be used routinely on patients receiving antibiotic therapy. One of us (B. R. F.) emphasised the value of the method during a discussion at the recent symposium on hospital coccal infections.[3]

A. ELLIOT-SMITH
Radcliffe Infirmary, Oxford. B. R. FRISBY.

PORPHYRINS IN BACTERIOLOGY

SIR,—Your annotation of May 25 on atypical acid-fast bacilli emphasises that it is not yet certain whether these organisms comprise a homogenous group or several different types. You also mention their chromogenic properties, and that made me wonder why bacteriologists have not studied the porphyrin production of these bacteria under varying cultural conditions as a means of classification.

That tubercle bacilli produce porphyrin under certain conditions has long been known,[4 5] and the same can be said of many cutaneous mycetæ.[6] But these properties have never been subjected to systematic bacteriological study. Only investigators primarily interested in porphyrins have studied these questions—e.g., in diphtheria bacilli,[7] *Bacillus cereus*,[8] and rhodopseudomonas species [9]—while the bacteriologists seem to have overlooked the possibilities of systematic porphyrin studies under varying cultural conditions. This is presumably because porphyrin analysis is difficult; but modern techniques of micro-analysis, paper chromatography, &c., have largely overcome this.

Recently the possible rôle of porphyrins in destruction of viruses in vitro has also been pointed out.[10]

Direct study of the fluorescence of the culture with a portable source of Wood's light is very cheap and easy,[11] although such simple studies will not be sufficient, since comparatively large amounts of porphyrin may be present without visible fluorescence [6] and even porphyrin chromogens may be present. The difficulty of obtaining adequate supplies of porphyrin markers for paper chromatography seems on the way to being conquered.[12]

Modern porphyrin techniques certainly offer a new field of development for the bacteriologist, especially where there are difficulties of classification.

Svendborg, Denmark. TORBEN K. WITH.

1. *Lancet*, June 8, 1957, p. 1172.
2. Cooke, J., Elliott, C., Elliot-Smith, A., Frisby, B. R., Gardner, A. M. N. *Brit. med. J.* March 9, 1957, p. 542.
3. *J. clin. Path.* (in the press); see *Lancet*, Jan. 12, 1957, p. 92.
4. Fischer, H., Fink, H. *Z. physiol. Chem.* 1925, **150**, 243.
5. Dhéré, C., Rapetti, L. *Bull. Acad. Méd. Paris*, 1935, **114**, 96.
6. Carrié, C., von Mallincrodt-Haupt, A. S. *Arch. Derm. Syph., Wien*, 1934, **170**, 521.
7. Hale, J. H., Rawlinson, W. A., Gray, C. H., Holt, L. B., Rimington, C., Smith, W. *Brit. J. exp. Path.* 1952, **31**, 96.
8. Schaeffer, P. *Biochim. biophys. acta*, 1952, **9**, 261, 362.
9. Lascelles, J. *Biochem. J.* 1956, **62**, 78. See also Ciba Symposium on Porphyrins, London, 1955; p. 265.
10. Kradolfer, F., Wyler, R. *Z. Hyg.* 1957, **143**, 416.
11. With, T. K. *Scand. J. clin. Lab. Invest.* 1957 (in the press).
12. Jorgensen, S. K., With, T. K. *Nature, Lond.* 1955, **176**, 156. With, T. K. *Ibid*, 1957, **179**, 824.

TUBERCULIN TREATMENT IN PULMONARY TUBERCULOSIS

SIR,—We should be grateful for an opportunity to comment on your timely annotation of June 8.

It seems wise to draw a clear distinction between the methods and aims of the two schools. One (ourselves) seeks to desensitise completely with total antigens and to maintain desensitisation for many months; generalised tuberculin reactions are avoided by the choice of dose and increment, and minimised by adjuvant therapy, yet are encountered at one stage in our course in about half of those desensitised. The other school (Smith and Vollum,[1] Howells and Swithinbank [2]) used purified protein derivative, attempt the induction of repeated generalised tuberculin reactions, and encounter some amount of desensitisation. Both court the hazard of the delayed anaphylactic reaction. This needs careful management.

If the capacity of the tubercle bacillus first to sensitise, then to cause hypersensitivity, and finally destruction is a dominant aspect of tuberculosis of the lungs then current chemotherapy with adjuvant treatment provides the opportunity to test this thesis. There are two additional reasons why these inquiries should be encouraged. The first is the limitations of classical chemotherapy in this disease, and the need to augment them. The second is the need to uncover substances which block the sensitising reaction at different stages; already some are known [3] and as more effective ones are discovered they must be tested in the clinic.

We have shown that desensitisation with the total antigens of the tubercle bacillus [4] is, in experienced hands, a safe and practical procedure in the presence of chemotherapy and we now have evidence that desensitisation to challenge with undiluted old tuberculin may be maintained by weekly, two-weekly, or monthly injections. While most patients who present with pulmonary tuberculosis today fall into that favourable prognostic group which responds successfully to chemotherapy, perhaps assisted by surgery, there remains a residue to try the ingenuity of the chest physician. They are those who lack host resistance, and by our reasoning are likely to benefit by desensitisation. Experience has reduced this group to the following:

(1) The severe post-primary attacks of children and adolescents (12–19) with gross mediastinal glandular enlargements.
(2) Those in whom chemotherapy and surgery have failed.
(3) Those with extensive chronic pulmonary bilateral disease unsuited to surgery, with a record of institutional treatment and relapse.
(4) Those who on admission show extensive bilateral cavitating disease unlikely to be suitable for surgical treatment.
(5) Those whose bacilli are partially resistant to one or more drugs.
(6) Those with extensive acute pneumonic tuberculosis.

Department of Pharmacology, King's College, London. GEORGE BROWNLEE.
Tuberculosis Chemotherapy Unit, Farnborough Hospital, Farnborough, Kent. D. G. MADIGAN.

SIR,—May I underline a few points in your excellent annotation.

The deliberate provocation of focal tuberculin reactions in cases of pulmonary tuberculosis has produced no adverse results either in the series presented by Howells and Swithinbank [2] or in the pilot survey in Oxford which preceded it. In tuberculous meningitis, on the other hand, intrathecal tuberculin should be used with the greatest care and with a full appreciation of its potential dangers. Dosage must be closely controlled by full examination of the C.S.F. each day. Facilities must be

1. Smith, H. V., Vollum, R. L. *Lancet*, 1950, ii, 275.
2. Howells, C. H. L., Swithinbank, J. *Tubercle*, 1957, **38**, 1.
3. Mongar, J. S., Schild, H. O. *J. Physiol.* 1957, **135**, 301.
4. Brownlee, G., Madigan, D. G. Ciba Foundation Symposium on Experimental Tuberculosis, 1955, p. 211.

available for the immediate relief of any undue rise in intracranial pressure.

The tuberculin courses given by Smith and Vollum [1 5] in meningitis and by Howells and Swithinbank [2] in pulmonary tuberculosis were designed specifically to provoke as many focal reactions as possible before the development of desensitisation. For this reason injections of tuberculin were spaced at intervals of 5 or 7 days. These series were not designed to study the significance of prolonged desensitisation and in neither instance was there any plan to continue tuberculin therapy as a long-term outpatient measure. The detailed daily C.S.F. examinations which are an essential part of Smith and Vollum's routine give a quantitative picture of the focal reaction in the tuberculous theca. In pulmonary tuberculosis the focal reaction can only be presumed from the presence of a mild general reaction characterised by fever, malaise, and, in some cases, brief increase in local symptoms and signs. These reactions, it is true, cause the patient some inconvenience. Not one of my 78 patients has asked to discontinue the course on account of unpleasant reactions. In one of the Oxford cases, tuberculin reactions provoked hæmoptysis from a giant cavity, and the treatment had to be stopped for this reason.

The focal tuberculin reaction is, as you say, a hyperæmic phenomenon designed to carry the antimicrobial drugs to the place where they will do the most good. It must be emphasised, however, that it is the inaccessible and not the resistant bacillus at which the reactions are aimed. There is little, sense and there may be real danger, in provoking hyperæmia in tuberculous tissues if the bacilli are thereby exposed only to drugs to which they are resistant.

The Churchill Hospital
Oxford.

F. RIDEHALGH.

PRIMARY HEPATIC CARCINOMA

SIR,—Your annotation of April 6 draws certain conclusions which do not appear altogether justified. While it is true that primary carcinoma of the liver is common in oriental countries and parts of Africa, there is insufficient evidence to justify the conclusion that the incidence is highest among the Bantu Negro. The older reports from this Institute refer to highly selected groups of young adult males in whom liver cancer is the most common tumour. While there is some evidence that the Bantu tribes in Portuguese East Africa may have a much higher incidence than those of the Union of South Africa,[6] comparison with the West African Negro is as yet impossible in the absence of incidence studies, which are only now being initiated. Visits to Uganda, the Belgian Congo, and French West Africa, however, have given me the impression that carcinoma of the liver is at least as common if not more frequent in some of these areas than in South Africa and what statistics are available support this view.[7]

In a series of necropsies from a general Bantu hospital in Johannesburg, primary carcinoma of the liver constituted slightly more than 2% of all necropsies. In a rate study, we found, however, that the incidence of primary carcinoma was 22% of all carcinomas in males.[8] While this relatively high frequency is mainly due to a high absolute incidence, it is accentuated by the composition of the population at risk which includes a high proportion of young adult males. The reduced incidence of cancer of the skin and of the gastro-intestinal tract in the local African also increases the relative frequency.

It is difficult to compare the frequency of cirrhosis in different populations, since we are dependent chiefly on post-mortem studies. In the United States the frequency of cirrhosis usually varies between 2 and 5% of all necropsies,[9] whereas the frequency of cirrhosis at post mortem in Johannesburg in the Bantu is approximately 9·1% in males and 4·0% in females.[10] On the other hand, for 1947–54, at the Boston City Hospital, in the series quoted by your editorial, the frequency was 13·93%.[11] While this hospital may not be representative of the United States as a whole, it is probably similar to those hospitals serving the Bantu population of South Africa. These observations should cast some doubt on the statement that the high incidence of primary liver cancer in Africa is mainly attributable to a higher frequency of cirrhosis. There is evidence on the other hand, however, to suggest that the high incidence of liver cancer in the African Negro and in other countries with a high incidence, may be dependent on the high frequency with which cirrhosis undergoes malignant change.[12] Approximately 54% of cirrhotic livers in males at post mortem in Johannesburg show malignant change.

You also state that the relationship of dietary deficiency to cirrhosis in both man and laboratory animals is now well established. While this may be true for animals, the rôle of nutrition in liver disease in man is far from clear. The only relatively well-documented "nutritional" liver disease in man is the fatty liver of kwashiorkor, in which cirrhosis is a very rare sequel.

In European practice the term "nutritional cirrhosis" is applied to the common "alcoholic" or Laennec's cirrhosis although the nutritional ætiology is by no means universally accepted. Livers of this nature, although common among the white races of South Africa, are exceedingly rare in the indigenous and poorer Bantu population.[10] In contrast the common cirrhosis in which carcinoma develops in South Africa is not of this type, but usually has the features of a post-necrotic or post-hepatitic cirrhosis. The ætiology is definitely unknown, but according to French studies, this cirrhosis may be viral in origin[13] and our experience supports this view. Nutrition as a direct factor in this type of cirrhosis has not been demonstrated.

I would therefore like to suggest that (i) a high frequency of cirrhosis has not yet been shown to be the cause of the high incidence of liver cancer in underprivileged communities; (ii) the relationship of diet to liver cancer and cirrhosis is by no means satisfactorily proven; and (iii) that the term "nutritional cirrhosis" in man be dropped until it can be used with greater knowledge of the ætiological background.

South African Institute for
Medical Research,
Johannesburg.

JOHN HIGGINSON.

THE WORD "ISOTOPE"

SIR,—This word, now so familiar, was introduced in Glasgow about 1912 by a medical woman—Margaret Todd, who was also a novelist writing under the name Graham Travers—to fit the concept of elements occupying the same place in the periodic table. The occasion was a social gathering at 11, University Gardens, then the home of Sir George Beilby (the father-in-law of the late Frederick Soddy, who originated the concept of isotopes and other achievements in radiochemistry including the first approach to atomic numbers). Having been obliged to use awkward periphrases to express his "isotopic" ideas, Soddy said he needed a word for the concept; Dr. Todd immediately suggested *isotope*—*iso*, the same, *topos*, place. The word had indeed been published a few years before in a context of organic chemistry; but there is no reason to suppose that Dr. Todd was aware of that.

5. Smith, H. V., Vollum, R. L., Taylor, I. M., Taylor, K. B. *Tubercle*, 1956, **37**, 301.
6. Berman, C. Primary Carcinoma of the Liver. London, 1951.
7. Denoix, P. F. *Schweiz. Z. Path. Bakt.* 1955, **18**, 564.
8. Higginson, J., Oettlé, A. G. *Acta Un. int. Cancr.* (in the press).
9. Lichtman, S. S. Diseases of the Liver, Gall Bladder and Bile Ducts. Vol. 2. London, 1953; p. 613.
10. Higginson, J., Grobbelaar, B. G., Walker, A. R. P. *Amer. J. Path.* 1957, **33**, 29.
11. MacDonald, R. A. *New Engl. J. Med.* 1956, **255**, 1179.
12. Higginson, J. *Schweiz. Z. Path. Bakt.* 1955, **18**, 625.
13. Charnot, R., Camain, R., Guidicelli, P. *Bull. Soc. Path. exot* 1953, **46**, 847.

Purists may like to note that *homotope* would be more exact; Soddy, however, gratefully adopted the suggestion of isotope, and its use in its now accepted sense was first published by him in 1913.

To commemorate the coining of the radiochemical word, the Glasgow and West of Scotland section of the Royal Institute of Chemistry is making arrangements to affix a plain lettered plaque bearing the names of Soddy and Dr. Todd to the house concerned. This house is now the property of the University of Glasgow, and the arrangements are being made with the consent and support of the University authorities. No public appeal for funds is being made.

HUGH NICOL
Chairman, Glasgow and West of Scotland section, Royal Institute of Chemistry.

West of Scotland Agricultural College, Glasgow, C.2.

Public Health

Influenza

INFLUENZA-A virus, provisionally identified as the Far Eastern type, has been isolated from several Pakistani seamen lately arrived in this country. The seamen fell ill after they had been flown to this country to man a ship in London. The virus has apparently established itself in North America. The disease has appeared among men of the United States Atlantic destroyer force at Newport, Rhode Island, and it is reported [1] that none of the crews affected had been in contact with persons from the Far East. The infection may have spread indirectly via Europe. At Newport about 550 sailors aboard eight ships were said on June 21 to have been infected. The disease lasted three or four days and the main features were severe headache, fever up to 104°F, and aching muscles. Military transports docking at Californian ports have had influenza aboard.

Speaking at a press conference in London [2] on June 18, Sir Macfarlane Burnet referred to the changes in the quality of the virus that took place every five to ten years. The last sharp change had been in 1946–47. The new type of virus might also continue for five to ten years, but after the first wave it would settle down to become "just ordinary influenza." Sir Macfarlane added that Australian laboratories would be ready to begin commercial production of a vaccine last week. Laboratories in other countries would also be preparing a similar vaccine (the Wright-Fleming Institute of Microbiology is doing so in London), but in Australia it had been an urgent matter because of the onset of winter. Nothing more extensive was contemplated than the vaccination of hospital nursing staffs and those in regular contact with travellers. Unless a country was prepared to take extreme measures, Sir Macfarlane said, it would not be possible to keep the infection completely at bay because of the new virus type.

A report from Holland [3] suggests that the new virus may be related to the one which caused the pandemic of 1889, since antibodies against it have been found only in people over 70 years of age.

Poliomyelitis

Uncorrected notifications of poliomyelitis in the week ended June 15 (24th week of the year) were as follows (previous week in parentheses): paralytic 41 (48), non-paralytic 42 (26); total 83 (74). The following figures compare this year's notifications with those in the preceding nine years:

Year	Total cases up to and including 24th week	Cases in 24th week
1948	612	15
1949	421	38
1950	933	93
1951	641	50
1952	651	48
1953	831	65
1954	566	32
1955	448	29
1956	689	43
1957	1167	83

1. *New York Times*, June 22, 1957.
2. *Times*, June 19, 1957.
3. *Manchester Guardian*, June 22, 1957.

Prevention and Cure in Sweden

In a talk broadcast on April 11, Miss Joan Lamont described Sweden as an example and an inspiration to the public-health worker. The infant-death rate, she said, was half that in Scotland, and the expectation of life greater; tuberculosis, thanks partly to B.C.G. vaccination, had "almost vanished."

She found that the differences were due to neither a better climate nor a higher standard of living, but rather to the emphasis on prevention in the training of nurses and doctors, and to the allocation of adequate money to preventive services, although expenditure on all health services was less than in Britain. For equal numbers of people there were fewer consultants, general practitioners, and hospital nurses in Sweden than in Britain, but many more public-health doctors and nurses. There were enough of these nurses (the equivalent of our health visitors) to do all the important jobs that needed them. Student nurses were treated as students, and were not used for routine ward-work any more than were medical students in Britain. The student spent a fair proportion of her nursing training with public-health nurses, and, even if she remained in hospital work, kept her interest in teaching health and preventing disease. Ward-orderlies were employed to do the unskilled work, and the prestige of nursing was such that it got its fair share of recruits of high calibre.

The Swedes, said Miss Lamont, had discovered that "prevention pays dividends not only in money but also in human happiness."

Diary of the Week

JUNE 30 TO JULY 6

Monday, 1st

INSTITUTE OF NEUROLOGY
5.30 P.M. (National Hospital for Nervous Diseases, Queen Square, W.C.1.) Prof. J. C. Eccles, F.R.S. (Australian National University): Central Action of Afferent Impulses from Muscle Spindles.

Tuesday, 2nd

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Dr. Isaac Berenblum (Weizmann Institute of Science, Israel): Some Recent Advances in Skin Carcinogenesis. (Imperial Cancer Research Fund lecture.)

Wednesday, 3rd

INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
5 P.M. Dr. N. Rh. Blegvad (Copenhagen): A Modern View of the Treatment of Sinusitis.
6 P.M. Dr. B. T. Withers (Houston, Texas): Combined Operation of Submucous Resection and Rhinoplasty.
INSTITUTE OF DISEASES OF THE CHEST, Brompton, S.W.3
5 P.M. Mr. O. S. Tubbs: Surgery of the Pericardium.

Thursday, 4th

ROYAL COLLEGE OF SURGEONS
5.30 P.M. Dr. W. H. Kelleher: The Modern Approach to the Treatment of Respiratory Defects in Poliomyelitis.

Friday, 5th

MEDICAL RESEARCH COUNCIL
5 P.M. (National Institute for Medical Research, Mill Hill, N.W.7.) Dr. G. W. Corner (Rockefeller Institute for Medical Research): The Rockefeller Institute for Medical Research—its Founders and its Achievements.

Appointments

HARRISON, M. H. M., CH.M. Leeds, F.R.C.S.: part-time orthopædic, casualty, and traumatic surgeon, United Birmingham Hospitals and Birmingham Regional Hospital Board.
ROPER-HALL, M. J., CH.M. Birm., F.R.C.S., D.O.M.S.: part-time ophthalmic surgeon, United Birmingham Hospitals and Birmingham Regional Hospital Board.
THOMPSON, P. W., M.B. Camb., F.F.A. R.C.S., D.A.: consultant anæsthetist, United Cardiff Hospitals.
WATSON, J. A., M.B. Glasg., D.M.R.D.: consultant radiologist, Cardiff Royal Infirmary.

Colonial Appointments:

BECKETT, D. W., M.D. Dubl., D.T.M. & H.: senior M.O. (medical superintendent), Fiji Leprosy Hospital, Makogai, Fiji.
HOLLINS, F. R. T., M.B. Dubl., D.P.H.: senior M.O., Tanganyika.
KELLETT, F. R. S., M.B. Calcutta, D.P.H.: superintendent M.O. (specialist), Trinidad.
LAMBO, T. A., M.D. Birm., D.P.M.: specialist (alienist), Western Region, Nigeria.
MYLES, P. J., L.A.H. Dubl., D.A.: M.O. (grade A) anæsthetist, Colonial Hospital, Port of Spain, Trinidad.

Notes and News

NATIONAL ASSISTANCE BOARD

THE report [1] of the board for 1956, shows that the number of weekly allowances rose during the year by 44,000 to 1,656,000 (covering the needs of over $2^1/_4$ million people). Payments of assistance in 1956 amounted to £105,160,000. More than two-thirds of the allowances went to supplement national insurance benefits, including 117,000 to supplement sickness benefit or industrial-injury payments.

About 300,000 people were registered as unemployed in December of last year. Of these, 73,000 were receiving assistance allowances (compared with 61,000 a year before). During 1956 the board collected information about people whose assistance was paid only on condition that they registered for employment. The results show that the hard core of the unemployed maintained by national assistance consist mainly of disabled persons and unskilled men and women with physical or mental limitations which restrict their chances of getting and keeping a job. During the year the number of reception centres for people without a settled way of living fell from 109 to 68. The average nightly number of people using the centres was about 1800, 130 more than in 1955.

URINE TEST FOR PHENYLKETONURIA

A SIMPLE test, using ferric chloride, has been devised for the detection of phenylpyruvic oligophrenia, and it has been recommended that every child be tested at the age of 21 days. If it is positive, dietary treatment can be started at once. Cards describing and illustrating the test may be had from the Secretary, The Hospital for Sick Children, Great Ormond Street, London, W.C.1, at 6*d*.

University of Cambridge

Dr. P. J. Randle has been elected to an official fellowship at Trinity Hall.

On June 15 the following degrees were conferred:

M.D.—Gordon Scott.
M.B., B.Chir.—J. M. L. Goddard (by proxy), R. C. M. Kew.
M.B.—P. J. Lachmann.

University of London

Sir John Charles has been appointed Heath Clark lecturer for 1959.

Mr. G. H. Bourne, D.SC., is resigning the readership in histology at London Hospital Medical College on Sept. 30, to take up the appointment of professor of anatomy and chairman of the anatomy department of Emory University, Georgia.

University of Sheffield

Dr. G. R. Hervey has been appointed lecturer in physiology.

University of Glasgow

On June 19 the honorary degree of LL.D. was conferred on Sir James Paterson Ross and Brigadier J. S. K. Boyd, F.R.S.

Royal Society of Tropical Medicine and Hygiene

Brigadier J. S. K. Boyd, F.R.S., has been elected president for the coming two years.

Society of Medical Officers of Health

Dr. H. D. Chalke has been elected president, and Dr. C. Metcalfe Brown chairman of council, of this society for 1957–58.

World Federation of Societies of Anæsthesiologists

The World Congress of Anæsthesiologists is to be held in Toronto from Sept. 4 to 10, 1960. All inquiries should be addressed to Dr. R. A. Gordon, chairman of the organising committee, 516, Medical Arts Building, Toronto 5, Ontario.

National Association for the Prevention of Tuberculosis

This association will commemorate the centenary of the birth of Sir Robert Philip by placing a tablet on the wall of 13, Bank Street, Edinburgh, where he founded the first tuberculosis dispensary in 1887. Mr. Walter Elliot will unveil the plaque on Friday, July 26, after a short ceremony to be held at noon in court room no. 4, Sheriff Court House, High Street, Edinburgh.

1. Cmd. 181. H.M. Stationery Office. 3*s*.

World Congress of Gastroenterology

This congress will be held in Washington, D.C., from May 25 to 31, 1958. Further particulars may be had from Dr. H. M. Pollard, University Hospital, Ann Arbor, Michigan, U.S.A.

Royal Medico-Psychological Association

The annual meeting of this association will be held in Oxford from July 2 to 5 under the presidency of Dr. R. W. Armstrong. Further particulars may be had from the secretary of the association, 11, Chandos Street, London, W.1.

Christian Medical Fellowship

This fellowship will hold its annual breakfast on Tuesday, July 16, at 8.15 A.M., at the Royal Station Hotel, Newcastle upon Tyne. Mr. Weldon Watts will be in the chair and Dr. R. G. Cochrane will speak on Changing Standards in Medical Practice. Further particulars will be found in our advertisement columns.

International Congress of Internal Medicine

The International Society of Internal Medicine is to hold its fifth congress next year from April 24 to 26 in Philadelphia under the presidency of Dr. T. Grier Miller. This will be the first time that the society has met outside Europe. The secretary-general is Dr. E. R. Loveland, 4200, Pine Street, Philadelphia, Pa.

Psychiatric Congresses at Zürich

The International Congress of Group Psychiatry is to be held at Zürich from Aug. 29 to 31. The following day, Sept. 1, the International Congress of Psychiatry will begin, and this will continue till Sept. 7. Its main theme is the Present Status of our Knowledge about the Group of Schizophrenias. Further particulars about both congresses may be had from the secretariat, Lengstrasse 28, Zürich 8, Switzerland.

Harveian Society of London

The summer meeting of this society was held on Sunday, June 23, when more than 60 members and guests attended a service at Hempstead Parish Church, Essex, where Harvey is buried. Dr. R. Cove-Smith gave an address and the service ended with prayers of thanksgiving and re-dedication by the Bishop of Colchester. Afterwards Mr. Dickson Wright was presented with a gold medallion to mark his presidency of the society and of the Harvey tercentenary congress.

Wellcome Trust

The Wellcome Trustees have made a grant of £5000 to McGill University, Montreal, for the purchase in the sterling area of books related to the history of medicine which are needed to fill gaps in the Osler Library. The Trustees have also agreed to provide £1200 annually for twenty-five years, to assist the further development of this library. A new extension and reading-room for the library, to be known as the Wellcome Camera, is to be provided by the university.

The Brain and its Functions

An Anglo-American symposium on the history and philosophy of knowledge of the brain and its functions is to be held in London from July 15 to 17 in connection with the first International Congress of Neurological Sciences, which is to take place in Brussels from July 21 to 28. The symposium is sponsored by the Wellcome Historical Medical Library with the coöperation of the National Hospital, Queen Square, and the Maudsley Hospital. Further particulars may be had from Dr. F. N. L. Poynter at the library, Euston Road, N.W.1.

Reorganisation of Local Government

At a meeting of the Rural District Councils Association (*Times*, June 20) Mr. Henry Brooke, Minister of Housing and Local Government, said that he hoped that a Bill on local-government reorganisation would be ready in the autumn. He realised that some of the smaller councils were disappointed because the white-paper did not offer them much in the way of additional functions; but he thought that we must face realities. Today some of the larger services, such as health and education, could not be operated over small units. But the Government proposed that the larger urban authorities—those with a population of at least 60,000—should automatically be given charge of the local health and welfare services which at present were exclusively a county-council responsibility. He believed that this would be a big step in the right direction for a service in which "the personal element matters so much, and to which the local elected representative has a personal contribution to make."

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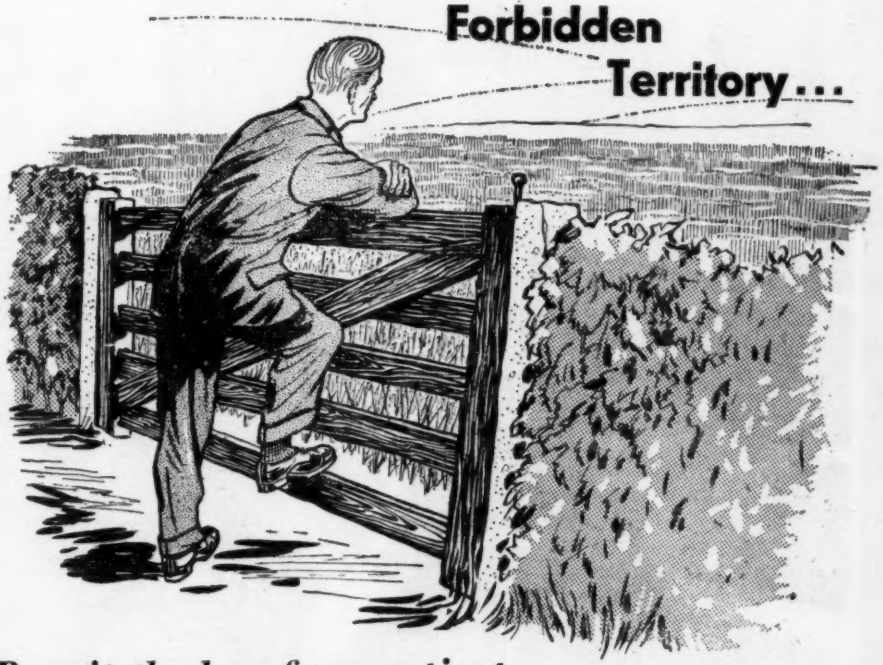

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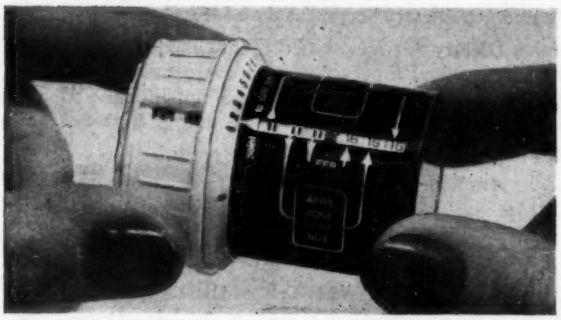

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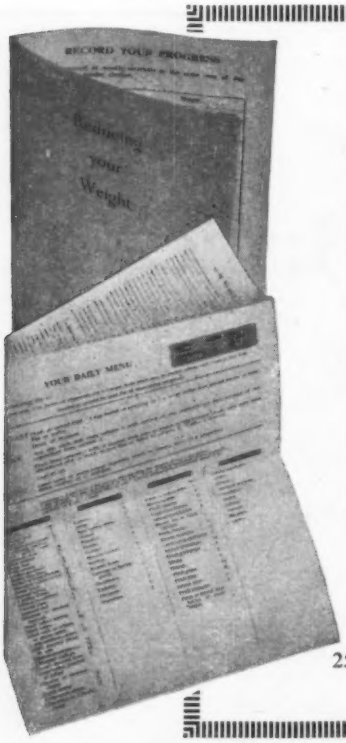

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Academic and Educational

UNIVERSITY OF LONDON

BRITISH POSTGRADUATE MEDICAL FEDERATION
INSTITUTE OF NEUROLOGY
(Queen-square)

2 COURSES OF CLINICAL DEMONSTRATIONS open to Post-graduates, will be held at The National Hospital, Queen-square, on WEDNESDAYS at 4 P.M. from 10TH JULY to 25TH SEPTEMBER, 1957, inclusive, and on SATURDAYS at 10.30 A.M. from 13TH JULY to 28TH SEPTEMBER, 1957, inclusive.

The fee for attending either of these courses is 2 guineas.

Application for a ticket should be made to the Dean, Institute of Neurology (Queen-square), The National Hospital, Queen-square, W.C.1, and a remittance to cover the fee enclosed. Only postal applications will be considered.

UNIVERSITY OF DURHAM

KING'S COLLEGE, NEWCASTLE UPON TYNE

COURSES OF INSTRUCTION FOR THE
POSTGRADUATE DIPLOMA IN PSYCHOLOGICAL MEDICINE

Part I. A PART-TIME COURSE will be given on 1½ days a week throughout the year, commencing in OCTOBER. Fee £20.

Part II. A 6-MONTHS COURSE IN PSYCHIATRY AND NEUROLOGY commences in OCTOBER. Fee £40.

The above courses are integrated with the Newcastle and Sheffield Regional Hospital Board Training Schemes for Psychiatrists. Arrangements can be made for candidates from overseas to complete the requisite clinical experience during the 6-months course. Separate courses, including clinical experience, are available in neurology (2 terms, fee £15) and child psychiatry (2 months, fee £25).

Further particulars, regulations and syllabus for the Diploma and application forms may be obtained from the Assistant Registrar, The Medical School, King's College, Newcastle upon Tyne, 1. G. R. HANSON, Registrar of King's College.

UNIVERSITY OF EDINBURGH

COURSE OF INSTRUCTION FOR THE POSTGRADUATE DIPLOMA IN PSYCHIATRY

Part I. A PART-TIME COURSE will be given on 1½ days a week throughout the academic year commencing in OCTOBER, fee £20.

Part II. A FULL-TIME 6-MONTHS COURSE IN PSYCHIATRY AND NEUROLOGY commencing in OCTOBER, fee £40.

The above Courses are integrated with the South East Regional Hospital Board Training Scheme for Psychiatrists. Honorary appointments can be arranged whereby candidates from other Regions and from Overseas can obtain the requisite clinical experience.

Further particulars, regulations and syllabus for the Diploma, and application forms may be obtained from the Faculty of Medicine, University New Buildings, Teviot-place, Edinburgh, 8.

THE UNIVERSITY OF SHEFFIELD

A REFRESHER COURSE for general practitioners will be held during the week beginning MONDAY, 23RD SEPTEMBER. The fee is 5 guineas, and accommodation at one of the University's Halls of Residence can be arranged at a moderate additional charge. National Health Service practitioners are (subject to certain conditions) eligible to have the course fee paid on their behalf and to receive also certain allowances (travelling expenses, subsistence, locum fees).

As the number who can be accepted is limited, inquiries and applications (stating whether or not the latter are made under the Scheme for National Health Service practitioners, and whether residential accommodation is desired) should be addressed as soon as possible to the Dean of the Faculty of Medicine, The University, Sheffield, 10.

THE ROYAL MEDICAL FOUNDATION OF EPSOM COLLEGE

The ANNUAL GENERAL MEETING of the Governors will be held on WEDNESDAY, 17TH JULY, 1957, at 3.30 P.M., in the Council Room of the Medical Defence Union, on the third floor of Tavistock House South, Entrance "D," Tavistock-square, London, W.C.1.

In addition to ordinary business the agenda will include the re-election of Governors to the Council and the election of a Vice-President.

A copy of the Agenda in detail will be posted to any Governor on request to me. By order of the Council,
A. Y. CANN, Secretary.

The Secretary's Office, Epsom College, Surrey, 31st May, 1957.

IMPERIAL CANCER RESEARCH FUND

DIRECTOR OF RESEARCH

The Council invite applications for a new post of Director of Research. He will be responsible for the initiation and direction of all cancer research in the Fund's laboratories. Their choice will not be limited to those who may make formal application and the Council reserve the right to fill the post by invitation.

The Fund is about to erect a modern laboratory b ock next to the Royal College of Surgeons in Lincoln's Inn-fields, London, and the Director will be required to assist in the planning of these laboratories and to take charge when complete. He should be medically qualified and well acquainted with the field of cancer research.

The Director's salary will be at least £4000 p.a. with appropriate children's allowances and membership of the F.S.S.U.

Further particulars and terms of appointment may be obtained from the Secretary, by whom applications must be received on or before 1st November, 1957.

KENNEDY CASSELS, Secretary.

Royal College of Surgeons of England,
Lincoln's Inn-fields, London, W.C.2.

CHRISTIAN MEDICAL FELLOWSHIP

ANNUAL BREAKFAST, TUESDAY, 16TH JULY, 1957, at 8.15 A.M., The Banqueting Hall, Royal Station Hotel, Newcastle upon Tyne. (During B.M.A. Meeting). Chairman: WELDON WATTS, M.S., F.R.C.S.ED. (President-Elect of the B.M.A.).

Speaker: ROBERT G. COCHRANE, M.D., F.R.C.P., D.T.M. & H.

Subject: "Changing Standards in Medical Practice."

Those intending to be present are asked to notify Dr. W. CONDIE, Pierremont, 36, Sunderland-road, Heworth, Gateshead, 10 (Tel. Felling 82619).

MEDICAL RESEARCH COUNCIL require a Medical OFFICER with a higher medical qualification and an interest in research, preferably with pædiatric experience in Africa, for work at their Infantile Malnutrition Research Unit, Mulago Hospital, Kampala, Uganda. The person appointed will be required to deputise for the Director of the Unit, when necessary, and to identify himself with the research programme of the Unit, which aims at a comprehensive study of the effects of malnutrition on the growth and development of the African child. Sick children are treated in research wards, and the progress of healthy children is followed at a welfare clinic and at schools. Starting salary (subject to U.K. income-tax) at a point on a scale £1520–£50–£1770 p.a., according to age and experience; scale is about to be improved. Child allowances of £50 p.a. per child, a foreign service allowance (not subject to U.K. income-tax and payable only while in Uganda) between £295 and £1170 p.a. according to circumstances, and an outfit and trunk allowance of £35, payable in addition. Appointment for initial tour of 18 months, plus 90 days home leave (including Sundays and travelling time) with possibility of further tour(s) leading to permanent employment with the Council. Superannuation provision will be made under the Federated Superannuation System for Universities or it may be continued under the National Health Service Scheme.

Write (full personal particulars and experience, plus a list of references to published work and the names of 2 professional referees) to Personnel Officer, Medical Research Council, 38, Old Queen-street, Westminster, S.W.1.

UNIVERSITY OF GLASGOW. Applications are invited for a LECTURESHIP IN BACTERIOLOGY. Salary according to placement on University scale for clinical teachers. The final maximum is £1750 p.a. F.S.S.U. and family allowance benefits.

Applications (12 copies) should be lodged, not later than 31st July, 1957, with the undersigned, from whom further particulars may be obtained.

ROBT. T. HUTCHESON, Secretary of University Court.

AUSTRALIA. UNIVERSITY OF ADELAIDE. Applications are invited for appointment as READER IN PHARMACOLOGY in the Department of Human Physiology and Pharmacology. The Reader will be expected to undertake such teaching as the Head of the Department may require; these duties will include the teaching of pharmacology to medical and pharmacy students. The salary scale for a Reader is £A2200–£50–£2400, with superannuation on the F.S.S.U. basis; and if the successful candidate be medically qualified, a special allowance at the rate of £200 a year may also be paid. The successful candidate will be expected to assume duty early in 1958.

A copy of the general conditions of appointment of Readers in the University, with particulars of the information to be supplied by candidates, may be obtained from the Secretary of the Association of Universities of the British Commonwealth, 36, Gordon-square, London, W.C.1, or from the Registrar. Applications should reach the Registrar, University of Adelaide, Adelaide South Australia, not later than 31st July, 1957.

CHRISTIAN MEDICAL COLLEGE, Ludhiana, Punjab, INDIA. Required urgently keen Christian doctors to fill the following posts:—

(1) PROFESSOR OF MIDWIFERY (Woman), M.R.C.O.G. or equivalent and 5-years teaching experience.
(2) PROFESSOR OF OPHTHALMOLOGY, F.R.C.S. or M.S. and 5-years teaching experience.
(3) SENIOR LECTURER IN GYNÆCOLOGY (Woman) postgraduate and 3-years teaching experience.
(4) SENIOR LECTURER IN E.N.T. DISEASES, F.R.C.S. or M.S. and 3-years teaching experience.

All posts carry missionary grades of salary with allowances and free furnished quarters.

Full particulars on application to the Secretary, Ludhiana British Fellowship, 12, Queen Anne's-gate, London, S.W.1 (TRAfalgar 5404).

Hospital Services: Senior Appointments

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD.

(1) CONSULTANT SURGEON, Northwood, Pinner and District Hospital, Northwood, Middlesex (36 Beds), 1 half-day a week.

Applications before 29th July, 1957.

(2) CONSULTANT PHYSICIAN in Physical Medicine (whole-time), Edgware General Hospital, Edgware, Middlesex (638 Beds), for 9 half-days a week, and National Temperance Hospital, Hampstead-road, N.W.1 (158 Beds), for 2 half-days a week.

Applications before 31st July, 1957.

(3) CHILD PSYCHIATRIST (7 half-days a week), Senior Hospital Medical Officer grade, Willesden Child Guidance Centre, 22, Brondesbury-villas, Kilburn, N.W.6 (Tel.: MAIda Vale 0621).

Applications before 6th August, 1957.

Hospitals and Centre may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary, North West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Part-time CONSULTANT OPHTHALMIC SURGEON to undertake 3 notional half-days a week in the Camberwell Group of hospitals. Extensive experience in the specialty, including major ophthalmic surgery is essential and the possession of a higher qualification is desirable. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales). Candidates may visit the hospitals concerned.

Apply, stating nationality, age, sex, qualifications and experience, including details of present appointment and of war service, together with the names and addresses of 3 referees, to the Secretary, Advisory Appointments Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 13th July, 1957.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time ASSISTANT CHEST PHYSICIAN to the Camberwell Group of hospitals. Duties will be mainly at the Chest Clinic, 23, Brunswick-park, Camberwell, S.E.5. Applicants must have had previous experience in chest diseases, and a higher qualification in medicine, a Diploma of Membership of a Royal College of Physicians or a Diploma in Public Health would be an advantage. Salary within the scale £1653 15s.–£52 10s.–£2126 5s. Applicants may visit the Clinic.

Apply, stating nationality, age, sex, qualifications and experience, including details of present appointment and of war service, together with the names and addresses of 3 referees, to the Secretary, Advisory Appointments Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, London, W.1, not later than 13th July, 1957.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Part-time CONSULTANT ORTHOPÆDIC SURGEON (3 half-days per week) for the Battersea and Putney Group of hospitals. Duties include 1 outpatient and 1 inpatient session weekly on separate days at Putney Hospital, S.W.15, comprising attendance on accident and orthopædic cases, and 1 session weekly of an outpatient nature (except for occasional emergencies) at Bolingbroke Hospital, S.W.11, where the Consultant appointed would be responsible for supervision of the present fracture and orthopædic work.

Applications, by letter (5 copies), giving date of birth, qualifications, experience, and names of 3 referees, to Secretary (S.1.), South West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 3rd August, 1957. Applicants may visit hospitals by local arrangement.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Part-time CONSULTANT PHYSICIAN in Physical Medicine (2 half-days per week) for the Battersea and Putney Group of hospitals. Duties mainly at Bolingbroke Hospital, S.W.11.

Applications by letter (5 copies), giving date of birth, qualifications, experience, and names of 3 referees, to Secretary (S.1.), South West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 3rd August, 1957. Applicants may visit hospitals by local arrangement.

ST. MARY'S HOSPITAL, Paddington, W.2. Applications are invited for the appointment of a Locum ASSISTANT RADIOTHERAPIST (Senior Hospital Medical Officer), for a period of 4 months, with effect from 1st August, 1957. Candidates are expected to hold the Diploma in Radiology and the successful candidate will be required to undertake a minimum of 5 notional half-days per week.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 16th July, 1957.

ST. MARY'S HOSPITAL, W.2, AND THE NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of Part-time CONSULTANT OPHTHALMIC SURGEON. 4 sessions per week at the Western Ophthalmic Hospital, where the main ophthalmic work of the Teaching Group is undertaken, and 1 outpatient session per week at Paddington General Hospital.

Applications (16 copies), stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should be sent not later than 16th August, 1957, to the House Governor, St. Mary's Hospital, London, W.2, from whom further information may be obtained.

BIRMINGHAM REGIONAL HOSPITAL BOARD.

Part-time CONSULTANT SURGEON (7 notional half-days weekly), mid-Worcestershire group. Duties mainly at Kidderminster General Hospital; also at Smallwood Hospital, Redditch, and Bromsgrove General Hospital. Higher qualification/wide experience specialty required.

Temporary CONSULTANT E.N.T. SURGEON (9 notional half-days weekly). Tenable for approximately 2 years from August, 1957, whilst present Consultant seconded to colonial appointment. Duties mainly at Hospital of St. Cross, Rugby, and Manor Hospital, Nuneaton. Higher qualification/wide experience specialty required. Retired Consultant considered.

Applications (15 copies), stating name, age, nationality, present and previous appointments and details of 3 referees, to Secretary, Regional Hospital Board, 10, Augustus-road, Birmingham, 15, by 29th July, 1957.

MANCHESTER REGIONAL HOSPITAL BOARD. Whole-time or maximum Part-time ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer) to the North Manchester Group of hospitals, mainly at Crumpsall Hospital (1200 Beds). Good experience essential, D.P.M. desirable.

Application forms from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, to be returned by 22nd July, 1957.

EAST ANGLIAN REGIONAL HOSPITAL BOARD. CONSULTANT PSYCHIATRIST AND DEPUTY MEDICAL SUPERINTENDENT (whole-time), Little Plumstead Mental Deficiency Group of hospitals. The Group (1100 Beds) maintains a large Outpatient Service in relation to mental deficiency and child guidance. Applicants must have D.P.M. and comprehensive experience of operation of M.D. Acts and Regulations. House available.

Applications (8 copies), stating age, experience and names of 3 referees, to the Board's Senior Administrative Medical Officer, 117, Chesterton-road, Cambridge, by 8th July, 1957. Candidates invited to visit hospitals by direct arrangement with Medical Superintendent.

EAST ANGLIAN REGIONAL HOSPITAL BOARD. CONSULTANT ORTHODONTIC SURGEON (whole-time or maximum part-time). The successful candidate will work at and from the Department of Dental Surgery, Ipswich and East Suffolk Hospital, Ipswich, and in addition to duties there will be required to provide an advisory and supervisory service in orthodontics to Hospital and School Dental Officers over a substantial portion of the region. The appointed candidate will be required also to advise on and participate in the further development of a Regional Orthodontic Service. Extensive experience in orthodontics and possession of higher qualifications necessary.

Applications (8 copies), stating age, experience and names of 3 referees, to the Board's Senior Administrative Medical Officer, 117, Chesterton road, Cambridge, by 15th July, 1957. Candidates invited to visit by direct arrangement with Hospital Management Committee Secretary, Ipswich and East Suffolk Hospital, Anglesea Road Wing, Ipswich.

LEEDS REGIONAL HOSPITAL BOARD. Whole-time or maximum Part-time CONSULTANT GERIATRICIAN, Halifax Group of hospitals (466 Beds). The successful candidate will be in clinical charge of the Geriatric Service in the area and will be required to reside in Halifax.

Applications (12 copies), stating age, qualifications and details of appointments held showing dates, with names and addresses of 3 referees, to the Secretary, Park-parade, Harrogate, by 9th August, 1957.

LEEDS REGIONAL HOSPITAL BOARD. Locum Tenens CONSULTANT in Pædiatrics (8 notional half-days per week) at Dewsbury from mid-August to mid-October, 1957.

Applications, stating age, qualifications and details of appointments held with dates, together with names and addresses of 3 referees, to the Secretary, Park-parade, Harrogate, as soon as possible.

LEEDS REGIONAL HOSPITAL BOARD. Applications are invited from medical practitioners for the appointment of ASSISTANT SENIOR MEDICAL OFFICER on the staff of the Senior Administrative Medical Officer at the Board Headquarters, Harrogate, at a salary of £1630–£80 (4)–£100 (1)–£2100 p.a. The officer concerned will be required to assist generally the Senior Administrative Medical Officer and particularly with the administration of the Board's Mental Health Services, for which expert psychiatric advice will be available. Previous experience of medical administration and a knowledge of mental health work will be considered an advantage.

Applications, with full details of qualifications and experience, together with the names of 3 referees, to be sent to the Secretary, Park-parade, Harrogate, by 18th July, 1957.

LEEDS REGIONAL HOSPITAL BOARD. Whole-time Locum CONSULTANT or SENIOR HOSPITAL MEDICAL OFFICER in Psychiatry, required immediately for 2–3 months at Broadgate Hospital, Beverley.

Applications, stating age, qualifications and details of appointments held with dates, together with the names and addresse of 3 referees, to the Secretary, Park-parade, Harrogate, as soon as possible.

NEWCASTLE REGIONAL HOSPITAL BOARD. Assistant RADIOLOGIST (Senior Hospital Medical Officer status), whole-time, or maximum part-time for a minimum of 9 optional half-days per week, for the Tees-side, Cleveland, Darlington, Northallerton and Sedgefield Groups of hospitals and 2 Mental Hospitals. Total population served approximately 609,000. At present there are 5 Specialist staff. Appointee to reside in the Tees-side area.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Newcastle Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 28 days.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time ASSISTANT ANÆSTHETIST required for the Barnsley Hospitals. Salary scale £1653 15s.–£52 10s.–£2126 5s.

Application forms and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 27th July, 1957.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Part-time CONSULTANT DERMATOLOGIST (2 half-days per week) for the Worthing Group of hospitals. Consultant appointed will have 2 male and 2 female beds at Southlands Hospital, Shoreham-by-Sea, and 1 outpatient session at Worthing Hospital.

Applications by letter (5 copies), giving date of birth, qualifications, experience, and names of 3 referees, to Secretary (S.1.), South West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 3rd August, 1957. Applicants may visit hospitals by local arrangement.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. WARLINGHAM PARK HOSPITAL, WARLINGHAM, SURREY. Vacancy for Locum SENIOR HOSPITAL MEDICAL OFFICER for a period of 18 weeks commencing 1st August, 1957, at the Croydon Child Guidance Clinic. Candidates should have had experience in child psychiatry.

Applications as soon as possible to the Acting Medical Superintendent, Warlingham Park Hospital.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Whole-time Locum CHEST PHYSICIAN (Senior Hospital Medical Officer grade) for the Chest Services in Portsmouth for 2 months from 11th July, 1957. The main duties will be in the Chest Clinic and Mass Radiography Unit. Remuneration will be in accordance with the terms and conditions of service of hospital medical and dental staffs.

Applications, stating age, qualifications, experience, &c., to the Area Secretary, Highcroft, Romsey-road, Winchester.

SCOTLAND. NORTHERN REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time post of ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer grade), at Craig Dunain Hospital, Inverness. House available.

Forms of application and further particulars may be obtained from the undersigned with whom applications should be lodged by 12th July, 1957. A. M. FRASER, M.D.,
Secretary and Administrative Medical Officer.
Office of the Northern Regional Hospital Board,
Raigmore, Inverness.

SCOTLAND. NORTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time, or maximum part-time, post of CONSULTANT RADIOLOGIST to the Regional Hospital Board. The main duties are at the Aberdeen Royal Infirmary, the Maternity Hospital and the Royal Aberdeen Hospital for Sick Children. In addition the successful applicant may be expected to visit other hospitals in the Region.

Applications, giving the names of 2 referees, should be submitted by 19th July, 1957, to the Secretary, North-Eastern Regional Hospital Board, Scotland, 1, Albyn-place, Aberdeen, from whom further particulars may be obtained.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Whole-time PSYCHIATRIST (Senior Hospital Medical Officer grade) at Bangour Village Hospital, Broxburn, West Lothian. A house (married) or residential accommodation (single) could be made available, and appropriate deductions made in respect of rent, &c.

Apply, giving particulars of age, qualifications and previous experience, and the names of 3 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 20th July, 1957.

WELSH REGIONAL HOSPITAL BOARD. Whole-time Locum Tenens CONSULTANT OBSTETRICIAN AND GYNÆCOLOGIST required Caernarvon and Anglesey area, 27th July–8th September, 1957.

Applications, naming 2 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff.

NORTHERN IRELAND HOSPITALS AUTHORITY. Applications are invited for a post as ASSISTANT ANÆSTHETIST, in the grade of Senior Hospital Medical Officer, at the Dental Department, Royal Victoria Hospital, Belfast. The appointment will be on a part-time basis of 4 half-days of duty weekly and the terms and conditions will be in accordance with the application of the Spens report to Northern Ireland.

Applications to be made on a form obtainable (with further particulars) from the Secretary, Northern Ireland Hospitals Authority, 44–46, Queen-street, Belfast, and to be returned not later than 20th July, 1957.

Hospital Services : Junior Appointments

ARCHWAY GROUP OF HOSPITALS, London, N.19. Applications are invited for the post of REGISTRAR ANÆSTHETIST. Post vacant 19th September, 1957. To work part-time in New End Hospital, Hampstead, N.W.3 (221 Beds), with special experience in endocrine surgery, and part-time in Whittington Hospital, N.19 (1060 Beds). Post recognised for D.A. and F.F.A.R.C.S.

Application forms obtainable from, and returnable to, the Group Secretary, 46, Cholmeley-park, N.6 (ARC. 3070, Ex. 527), by 8th July, 1957.

BETHNAL GREEN HOSPITAL, Cambridge Heath-road, E.2. HOUSE SURGEON required. Gynæcological and obstetrics, pre-registration post. Vacancy 23rd July, 1957.

Applications, stating experience and copies of 2 testimonials, to Hospital Secretary.

BOLINGBROKE HOSPITAL, Wandsworth Common, S.W.11. HOUSE SURGEON (resident), vacant 24th July, 1957. Open to registered practitioners and pre-registration candidates.

Apply Hospital Secretary, enclosing copies of 3 recent testimonials.

BROMPTON HOSPITAL, S.W.3. Applications invited for post of SURGICAL REGISTRAR (whole-time). The appointment is for 1 year with eligibility for reappointment. Candidates must hold the Diploma of F.R.C.S.

Applications, stating age, qualifications with dates, nationality and appointments held, together with copies of testimonials, by 6th July, 1957, to KENNETH A. F. MILES, House Governor.

BROMPTON HOSPITAL, S.W.3. Applications invited for post of NON-RESIDENT HOUSE PHYSICIAN for 9 months from 1st September, 1957. Duties include work in Outpatient Department, wards, Cardiac and E.N.T. Departments. Salary at the rate of £577 10s. p.a.

Applications, stating age, qualifications with dates, nationality, and appointments held, together with copies of testimonials, by 6th July, 1957, to—
KENNETH A. F. MILES, House Governor.

CHARING CROSS HOSPITAL GROUP. Unit at Mount VERNON HOSPITAL. JUNIOR HOSPITAL MEDICAL OFFICER with duties as House Physician to the Pædiatric Department and Assistant in the General Medical Outpatient Department and in the general medical wards. Tenable for 1 year from 1st August, 1957, in the first instance.

Applications, on forms obtainable from the undersigned, to be returned by 15th July, 1957.
FRANK HART, Secretary to the Board.

CONNAUGHT HOSPITAL, Walthamstow, E.17. (118 Beds.) Applications are invited for the post of SECOND CASUALTY OFFICER with duties in the Department of Orthopædic and Traumatic Surgery (Senior House Officer grade). Recognised for F.R.C.S. Salary £819 10s. p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

GERMAN HOSPITAL, London, E.8. (General—157 Beds.) Applications for the 6-months resident appointment, vacant 22nd July, of registered HOUSE PHYSICIAN should reach the Group Secretary, Hackney Hospital, London, E.9, by 12th July, quoting GH/HS.

GUY'S-MAUDSLEY NEUROSURGICAL UNIT. Applications are invited for the resident post of SENIOR HOUSE OFFICER for 6 months commencing August, 1957. The unit, which is housed in the Maudsley Hospital, serves Guy's Hospital, and the Bethlem Royal Hospital and the Maudsley Hospital.

Applications should be made within 2 weeks of the appearance of this advertisement to—
K. J. JOHNSON, House Governor and Secretary.
Maudsley Hospital, Denmark-hill, S.E.5.

HACKNEY HOSPITAL, London, E.9. (General—641 Beds.) Applications for the 6-months resident appointment, from 1st August, of pre-registration HOUSE SURGEON (recognised for F.R.C.S.) should reach the Secretary, above address, by 8th July, quoting HH/PHS.

HAMMERSMITH HOSPITAL AND POSTGRADUATE MEDICAL SCHOOL, Ducane-road, London, W.12. Locum REGISTRAR (hæmatology) required for approximately 3 months commencing immediately.

Detailed applications to Secretary, Board of Governors, immediately.

LAMBETH HOSPITAL, Brook-drive, S.E.11. Applications are invited from pre-registration and registered medical practitioners for the post of RESIDENT HOUSE SURGEON, vacant 11th August, 1957. The successful candidate will be required to carry out a fortnight's Locum duty starting on 28th July, 1957. The post is recognised for the F.R.C.S.

Application forms from the acting Physician-Superintendent.

LEWISHAM GROUP LABORATORY, LEWISHAM HOSPITAL, London, S.E.13. Applications are invited for 1 of 2 posts of SENIOR HOUSE OFFICER in Pathology, vacant 17th July. The appointment may be either fully resident or resident only when on duty.

Applications, stating age, qualifications and experience, with copy testimonials or names of referees, to Group Secretary, Lewisham Hospital, S.E.13.

LONDON CHEST HOSPITAL. Hospitals for Diseases OF THE CHEST. A vacancy occurs 1st September, 1957, for RESIDENT SURGICAL OFFICER. Appointment for 6 months with prospect of renewal. Post graded as Senior House Officer or Registrar according to qualifications and previous surgical experience.

Applications, stating date of birth, qualifications with dates, and previous appointments held with copies of 3 testimonials, should reach the undersigned not later than 17th July, 1957.
THOMAS BROWN, House Governor.
London Chest Hospital, E.2.

LONDON HOSPITAL, Whitechapel, E.1. Applications are invited for the post of SENIOR HOUSE OFFICER to the Department of Anæsthetics vacant on 1st August.

Applications (6 copies), together with 6 copies of 3 recent testimonials, should be received by the undersigned by 9th July, 1957. H. BRIERLEY, House Governor.

MEMORIAL/BROOK GENERAL HOSPITAL, Shooters Hill, Woolwich, S.E.18. HOUSE PHYSICIAN (pædiatrics and infectious diseases), vacant mid-July. Not pre-registration. The post is recognised for D.C.H. and entails routine ward and outpatient work, including experience in the modern Infectious Diseases Unit and with neonates.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited from registered medical practitioners for the appointment of ANÆSTHETIC REGISTRAR (resident). This post carries the grade of Registrar.

Applications, giving the names of 3 referees, to be sent to the undersigned not later than 3rd July, 1957.
H. EWART MITCHELL,
Secretary to the Board of Governors.
The National Hospitals for Nervous Diseases,
Queen-square, London, W.C.1.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited from registered medical practitioners for the appointment of SURGICAL REGISTRAR at The National Hospital, Queen-square, W.C.1. This post carries the grade of Senior Registrar. The appointment will be for 1 year in the first instance.

Applications, with names of 3 referees, to be sent to the undersigned not later than 3rd July, 1957.
H. EWART MITCHELL,
Secretary to the Board of Governors.
The National Hospital, Queen-square, W.C.1.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited from registered medical practitioners for the appointment of REGISTRAR (whole-time) to the Department of Clinical Pathology at The National Hospital, Queen-square, W.C.1. This post carries the grade of Registrar. The appointment will be for 1 year in the first instance.

Applications, with names of 2 referees, to be sent to the undersigned not later than 3rd July, 1957.
H. EWART MITCHELL,
Secretary to the Board of Governors.
The National Hospital, Queen-square, W.C.1.

NELSON HOSPITAL, Kingston-road, Merton, S.W.20. HOUSE SURGEON (resident). Approved for Pre-registration Service. Vacant 2nd August.

Applications, stating age, qualifications, &c., with the names and addresses of 2 referees, to the Secretary at above address.

PADDINGTON GENERAL HOSPITAL, Harrow-road, W.9. (582 Beds.) Applications are invited for the post, commencing 16th September, 1957, of REGISTRAR (obstetrics and gynæcology), whole-time. Resident or non-resident. Resident post recognised for M.R.C.O.G. Department contains 87 obstetric and 38 gynæcological beds. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary to Committee, Paddington Group Hospital Management Committee, Harrow-road, W.9, by 17th July.

PADDINGTON GENERAL HOSPITAL, Harrow-road, W.9. (582 Beds.) Applications are invited to fill the post of SENIOR HOUSE OFFICER (casualty), resident on duty (1 of 3). Recognised for F.R.C.S.

Applications, stating age, experience, qualifications, together with names and addresses of 2 referees, to be sent to Hospital Secretary by 15th July.

POPLAR HOSPITAL, East India Dock-road, E.14. Bow GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum Tenens REGISTRAR in Anæsthetics required at above Hospital for approximately 6 weeks as from 15th July, 1957.

Applications to Hospital Secretary.

ROYAL FREE HOSPITAL GROUP. Applications are invited from suitably qualified medical practitioners for the post of Part-time SENIOR REGISTRAR (6 sessions per week) in the Ophthalmic Departments of the Royal Free Hospital. The appointment is for 1 year in the first instance.

Formal application should be made, giving the names of 3 referees, to the Secretary to the Board of Governors, Royal Free Hospital, Gray's Inn-road, W.C.1, not later than 8th July, 1957.

ROYAL FREE HOSPITAL GROUP. Applications are invited for the post of SENIOR SURGICAL REGISTRAR for 1 year to work at the Royal Free Hospital and the Hampstead General Hospital, to cover the absence of the present holder abroad. Salary in accordance with the scale laid down by the Ministry of Health—duties to commence as soon as possible.

Applications should be made to the Secretary, Royal Free Hospital, Gray's Inn-road, London, W.C.1, as soon as possible.

ROYAL LONDON HOMŒOPATHIC HOSPITAL. North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SURGICAL REGISTRAR required at the above Hospital, whole-time, non-resident. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary, Royal London Homœopathic Hospital Management Committee, Great Ormond-street, W.C.1, by 31st July, 1957.

ROYAL NORTHERN HOSPITAL. (279 Beds.) North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SURGICAL REGISTRAR (second) required at above Hospital. Candidates may visit the Hospital by direct appointment.

Application forms obtainable from, and returnable to, the Secretary, Royal Northern Hospital, Holloway, London, N.7, by 9th July, 1957.

ROYAL NORTHERN HOSPITAL, Holloway, N.7. Applications are invited for the post of CASUALTY OFFICER (Senior House Officer grade), with duties in the Ophthalmic Department, vacant July, 1957. Recognised for F.R.C.S.

Applications to be sent to the Hospital Secretary by 9th July, 1957.

SOUTH LONDON HOSPITAL FOR WOMEN AND CHILDREN, Clapham Common, London, S.W.4. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited from registered Women medical practitioners for the post of Full-time SURGICAL REGISTRAR (recognised for the F.R.C.S.). Resident or non-resident (if living near the Hospital). Vacant shortly. The appointment is normally for 2 years but subject to review at the end of first year. Canvassing will disqualify, but candidates are not precluded from visiting the Hospital if they so desire.

Forms of application from the Secretary, Lambeth Group Hospital Management Committee, Renfrew-road, S.E.11, to whom completed applications should be returned not later than 13th July, 1957.

SOUTH-EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in Infectious Diseases and General Medicine at Hither Green Hospital, Hither Green-lane, S.E.13, to fill a vacancy in the approved trainee establishment at the Lewisham Group of hospitals. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales), and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 13th July, 1957.

SOUTH WESTERN HOSPITAL, Landor-road, S.W.9. LAMBETH GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from Women candidates for the post of HOUSE SURGEON (pre-registration) at the above Hospital. Duties include general surgery and the successful applicant will also be required to provide relief for leave of the House Surgeon at the Annie McCall Maternity Hospital.

Application forms from the Hospital Secretary to be returned not later than 13th July, 1957.

ST. JAMES' HOSPITAL, Balham, London, S.W.12. SENIOR HOUSE OFFICER (gynæcology). Post vacant middle of August. Recognised for M.R.C.O.G.

Applications, stating age, qualifications, experience, and names of 2 referees, to Group Secretary, Wandsworth Hospital Group, at above address by 8th July. (0348.)

ST. ANDREWS HOSPITAL, Devons-road, Bow, E.3. HOUSE PHYSICIAN. Recognised pre-registration appointment, commencing 15th August, 1957.

Applications, with copy of at least 1 testimonial, should be sent to Hospital Secretary immediately.

ST. LEONARD'S HOSPITAL, Nuttall-street, N.1. (Acute general—192 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER in General Medicine. The appointment is for 12 months.

Applications, with 2 testimonials, to the Hospital Secretary by 12th July.

ST. MARY'S HOSPITAL, Paddington, W.2. Applications are invited from suitably qualified practitioners, for the post of NON-RESIDENT CASUALTY SURGEON. Candidates must have held an appointment as House Surgeon at this Hospital or at another hospital approved by the Board of Governors. The appointment is for a first period of 6 months, with effect from 1st September. Remuneration at Senior House Officer rates.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 16th July, 1957.

ST. MARY'S HOSPITAL, W.2. Ophthalmic Department. WESTERN OPHTHALMIC HOSPITAL, Marylebone-road, N.W.1. Applications are invited for the post of Whole-time SENIOR REGISTRAR (non-resident). Candidates must have post-graduate experience and should hold, or be studying for, the F.R.C.S. The successful candidate will be expected to take up his duties as soon as possible.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, should reach ALAN POWDITCH, House Governor, St. Mary's Hospital, not later than 12th July, 1957.

WEST HAM GROUP HOSPITAL MANAGEMENT COMMITTEE, Stratford, E.15. ANÆSTHETIST (Resident Senior House Officer grade) for 12 months commencing 11th August, 1957. 6 months at Queen Mary's Hospital for the East End and 6 months at East Ham Memorial Hospital. Combined post recognised for D.A. and F.F.A.R.C.S.

Applications, with names of 3 referees, to Group Secretary, West Ham Group Hospital Management Committee, Stratford, E.15, by 5th July, 1957.

WESTMINSTER CHILDREN'S HOSPITAL. Westminster HOSPITAL TEACHING GROUP. CASUALTY OFFICER required for 6 months from 1st August, 1957. Grade, House Officer (post-registration) or Senior House Officer, dependent on experience.

Applications, with copies of testimonials should reach the Secretary, Westminster Children's Hospital, Vincent-square, S.W.1, by 6th July.

ABERDEEN GENERAL HOSPITALS BOARD OF MANAGEMENT. WOODEND GENERAL HOSPITAL. Applications are invited for the appointment of JUNIOR HOSPITAL MEDICAL OFFICER in the Thoracic Surgery Department of the above Hospital. The post, which is non-resident, is now vacant. The appointment is subject to the conditions of service issued by the Department of Health for Scotland.

Applications, giving details of qualifications and experience, and the names of 2 referees, should be lodged with the Secretary, Aberdeen General Hospitals, P.O. Box No. 92, 52, Queen's-road, Aberdeen, within 14 days of the appearance of this advertisement.

ACCRINGTON. VICTORIA HOSPITAL. Blackburn and DISTRICT HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN required for 5th July, 1957. Recognised for pre-registration purposes.

Apply to Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

ALTRINCHAM GENERAL HOSPITAL. Assistant Senior SURGICAL OFFICER (Junior Hospital Medical Officer grade). Applications are invited for this post in a hospital of 130 acute beds with a busy Casualty Department. The appointee would be required to exercise control of this Department and also to assist Resident Surgical Officer with the general surgical work of the Hospital. The post offers excellent opportunities of practical experience and postgraduate study to suitably qualified candidates and particularly those studying for higher surgical qualifications.

Applications, with names of 2 referees, to Group Secretary, North and Mid-Cheshire Hospital Management Committee, Sinderland-road, Altrincham.

ASHTON, HYDE AND GLOSSOP HOSPITAL MANAGEMENT COMMITTEE.

2 HOUSE PHYSICIANS required at Ashton-under-Lyne General Hospital. 1 post vacant end of July, 1 vacant mid-August. Preference given to pre-registration candidates.

HOUSE OFFICER (midwifery) required. Post recognised for D.Obst.R.C.O.G., vacant mid-August. Preference given to pre-registration candidates.

Applications, with copies of 2 testimonials, to Group Secretary, General Hospital, Ashton-under-Lyne, Lancs.

AYLESBURY. ROYAL BUCKINGHAMSHIRE HOSPITAL. Locum CASUALTY OFFICER (Senior House Officer), resident, for period 20th July–3rd August.

Apply, with 2 names for reference, to Secretary-Superintendent.

AYLESBURY, BUCKINGHAMSHIRE. STOKE MANDEVILLE HOSPITAL. PLASTIC SURGERY AND JAW INJURIES UNIT. (NUFFIELD BURNS UNIT.) Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER in the above department of the Hospital. Duties will include care of patients in the Burns Unit (under supervision), and also work in general plastic wards and the theatre.

Applications, with the names of 2 referees, to the Administrative Officer.

BARNSLEY. BECKETT HOSPITAL. Locum House SURGEON or PHYSICIAN required for period 7th July–21st July, 1957.

Apply to the Group Secretary, 33, Gawber-road, Barnsley.

BARNSTAPLE. NORTH DEVON INFIRMARY. (105 Beds.) HOUSE PHYSICIAN (pre-registration) required. Post vacant mid-July.

Applications to Group Secretary, North Devon Hospital Management Committee, 19, Alexandra-road, Barnstaple.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 Beds.) HOUSE PHYSICIAN (House Officer or Senior House Officer grading according to experience). Pre-registration post, but fully qualified practitioners may apply.

Apply Group Secretary.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 Beds.) Locum ORTHOPÆDIC HOUSE SURGEON (Senior House Officer or House Officer grading according to experience).

Applications to Group Secretary.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 acute beds.) ORTHOPÆDIC HOUSE SURGEON (first, second or third post), vacant now. Offers good opportunity for general experience in busy acute general hospital. Approved pre-registration post. Fully qualified practitioners may apply. Recognised for F.R.C.S.

Apply Group Secretary.

BIRMINGHAM REGIONAL HOSPITAL BOARD.

(1) **Birmingham (Selly Oak) Group, Oak Tree-lane, Birmingham, 29**

REGISTRAR (anæsthetics) for Selly Oak Hospital (1050 equipped beds). Resident/non-resident. Post recognised for F.F.A.R.C.S. and D.A.

(2) **Mid-Worcestershire Group, Birmingham-road, Bromsgrove, Worcester**

REGISTRAR (casualty) required for Kidderminster and District General Hospital (112 Beds) also to deputise for Surgical Registrar. Experience specialty essential. Higher qualification desirable. Resident or non-resident.

(3) **Wolverhampton Group, The Royal Hospital, Wolverhampton**

REGISTRAR (pathology), resident or partly resident. Experience in specialty an advantage. Duties in all branches of clinical pathology centred on the Royal Hospital.

Application forms from Group Secretaries to be returned by 8th July, 1957.

BIRMINGHAM REGIONAL HOSPITAL BOARD. Whole-time SENIOR REGISTRAR in Obstetrics and Gynæcology. Duties mainly at Women's Hospital, Wolverhampton (91 obstetric and gynæcological beds). Resident. Married quarters available. M.R.C.O.G. essential. Successful candidate may subsequently be required to spend not more than 2 years in a selected hospital of the United Birmingham Hospitals under the scheme for interchange of Senior Registrars between the 2 Boards.

Application forms from Secretary, Regional Hospital Board, 10, Augustus-road, Birmingham, 15, to be returned by 29th July, 1957.

BIRMINGHAM, 15. ROYAL ORTHOPÆDIC HOSPITAL. SENIOR HOUSE OFFICER. Preferably with orthopædic experience. Recognised by Royal College of Surgeons. 334 Beds for long and short term orthopædic cases (non-traumatic) and extensive outpatient services.

Applications, with testimonials or names of referees, to Administrator.

BIRMINGHAM. SOLIHULL HOSPITAL, Lode-lane, SOLIHULL. HOUSE PHYSICIAN (pre-registration post), vacant mid-July. General Hospital offering good experience. 5 other resident medical staff.

Applications, with names of 2 referees, to Medical Superintendent as soon as possible.

BIRMINGHAM. SOLIHULL HOSPITAL, Lode-lane, SOLIHULL. HOUSE SURGEON (pre-registration post), vacant end of June. General Hospital offering good experience. 5 other resident medical staff.

Applications, with names of 2 referees, to Medical Superintendent immediately.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. Applications are invited for the post of MEDICAL REGISTRAR (Senior Registrar grade). The appointment is subject to annual review and the successful candidate will be required to spend the first year at The Royal Hospital, Wolverhampton, in accordance with the arrangements for the interchange of Senior Registrars agreed between the 2 Boards. The successful candidate may be required to be resident.

Forms of application may be obtained from and should be returned not later than 13th July, 1957, to the Secretary, United Birmingham Hospitals, Queen Elizabeth Hospital, Edgbaston, Birmingham, 15.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. QUEEN ELIZABETH HOSPITAL. Applications are invited for the post of NEUROLOGICAL REGISTRAR (non-resident), Senior Registrar or Registrar according to qualifications and experience, for duty in the United Hospitals. The post is tenable for 1 year in the first instance. Candidates should preferably have had resident experience in either a special neurological hospital or a neurological department in a general hospital; general medical experience is essential.

Forms of application may be obtained from, and should be returned not later than 20th July, 1957, to, the Secretary, United Birmingham Hospitals, Queen Elizabeth Hospital, Birmingham, 15.

BIRMINGHAM, 9. LITTLE BROMWICH GENERAL HOSPITAL. HOUSE SURGEON (Male or Female). Recognised as pre-registration appointment. Post vacant July.

Apply Physician-Superintendent with copies of 2 testimonials or names of referees.

BIRMINGHAM, 9. LITTLE BROMWICH GENERAL HOSPITAL. HOUSE PHYSICIAN (Male/Female), vacant 12th July, 1957. Recognised as pre-registration appointment.

Apply Physician-Superintendent, with copies of 2 testimonials or names of referees.

BEDFORD GENERAL HOSPITAL. (436 Beds.) House SURGEON required. Pre- or post-registration. Recognised for F.R.C.S. Post offers exceptional opportunities for general experience in busy acute Surgical Units.

Inquiries and applications, with copies of 2 recent testimonials, to Group Secretary, 3, Kimbolton-road, Bedford.

BEXHILL HOSPITAL, Bexhill. (62 Beds.) Resident HOUSE SURGEON required. Pre-registration post vacant 15th July. National scale of salary.

Apply to Hospital Administrator.

BISHOP AUCKLAND, co. DURHAM. THE GENERAL HOSPITAL. (350 Beds.) SOUTH WEST DURHAM HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN required. Fully registered practitioner or pre-registration candidate.

Apply, naming 2 referees, to K. G. T. LUXFORD, Group Secretary, at the above address.

BISHOP'S STORTFORD, HERTFORDSHIRE. HERTS AND ESSEX GENERAL HOSPITAL. (400 Beds.) Applications are invited for the post of HOUSE OFFICER (surgical), pre-registration. Salary £467 10s.–£522 10s. p.a., less £125 in respect of residential emoluments. Appointment to commence 8th August, 1957.

Applications, stating age, nationality, qualifications and experience with copies of 2 recent testimonials or the names of referees, to the Hospital Secretary.

BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (pathology) required for duties at Royal Infirmary, Blackburn (Group Laboratory), but may also be required for duties at Queen's Park Hospital, Blackburn, and Victoria Hospital, Accrington, at Consultant's discretion. Recognised for D.Path. Post vacant 2nd October, 1957.

Applications, with names of 2 referees, to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BOLTON DISTRICT GENERAL HOSPITAL (607 Beds, including 107 for obstetrics and 30 for gynæcology.) RESIDENT SENIOR HOUSE OFFICER for Department of Obstetrics and Gynæcology. Vacant 8th July and tenable for 12 months. Hospital recognised for M.R.C.O.G. and D.Obst.R.C.O.G.

Applications, stating age, nationality, qualifications, experience, and the names of 2 referees, to Group Secretary, Bolton and District Hospital Management Committee, The Royal Infirmary, Bolton.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road, BOSCOMBE. (492 Beds.) BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of NON-RESIDENT SENIOR HOUSE OFFICER (orthopædics and casualty combined). The post, which is recognised for the F.R.C.S. examination, is now vacant. The Unit consists of Registrar and 2 Senior House Officers with an additional Senior House Officer during the summer months. Furnished flat available on sea front.

Applications to the Hospital Secretary.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road. (492 Beds.) BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of GENERAL HOUSE SURGEON. The appointment, which is recognised for the F.R.C.S. examination and pre-registration purposes, becomes vacant on 15th July, 1957.

Applications to the Hospital Secretary.

BURTON-ON-TRENT. GENERAL HOSPITAL. Non-RESIDENT JUNIOR HOSPITAL MEDICAL OFFICER ANÆSTHETIST required at the above Hospital.

Applications to Group Secretary, General Hospital, Burton-on-Trent, as soon as possible.

BRIGHTON AND LEWES HOSPITAL MANAGEMENT COMMITTEE. Locum ANÆSTHETIC REGISTRARS required for 2 periods from 8th to 21st July and from 9th to 29th September, 1957.

Applications, giving details of experience, with the names of 2 referees, to Group Secretary, Brighton and Lewes Hospital Management Committee, Royal Sussex County Hospital, Eastern-road, Brighton, 7.

BRIGHTON GENERAL HOSPITAL. Applications are invited for the appointment of HOUSE SURGEON to the Orthopædic Unit. Salary in accordance with national scale. This post is recognised as a pre-registration appointment.

Applications, stating age, qualifications, and experience, together with copies of recent testimonials, should be sent to the Physician-Superintendent, Brighton General Hospital, Elmgrove, Brighton.

BRIGHTON GENERAL HOSPITAL, Brighton. BRIGHTON AND LEWES HOSPITAL MANAGEMENT COMMITTEE. Locum REGISTRAR or SENIOR HOUSE OFFICER in Geriatrics required for whole-time duties at the above Hospital from 18th July, 1957, for approximately 2 months or until such time as a permanent appointment has been made. Residential accommodation can be provided if necessary.

Further details on application to the Group Secretary, Brighton and Lewes Hospital Management Committee, Royal Sussex County Hospital, Eastern-road, Brighton, 7 (Telephone: Brighton 29155).

BRIGHTON. ROYAL SUSSEX COUNTY HOSPITAL. Locum REGISTRAR in General Surgery required at the above Hospital, vacant early July.

Applications, stating age, qualifications and experience, and naming 2 referees, to the Group Secretary, Brighton and Lewes Hospital Management Committee, Royal Sussex County Hospital, Brighton, 7, from whom further information regarding the post may be obtained.

BRIGHTON. ROYAL SUSSEX COUNTY HOSPITAL. (312 Beds.)

HOUSE SURGEON required mid-July.

2 CASUALTY HOUSE SURGEONS (duties include work in Orthopædic and Traumatic Unit), vacant beginning and end July.

All posts recognised for pre-registration and F.R.C.S.

Applications, stating usual particulars, and naming 2 referees, to the Administrative Officer, Royal Sussex County Hospital, Brighton, 7.

BRIGHTON. ROYAL ALEXANDRA HOSPITAL FOR SICK CHILDREN, Dyke-road. (130 Beds.) Vacancy for HOUSE SURGEON for 6 months from 1st August, 1957. The post offers wide experience in pædiatrics and is recognised for D.C.H. The post is open to pre-registration candidates.

Applications, stating age, nationality, qualifications, and experience, together with copies of recent testimonials, to the Administrative Officer as soon as possible.

BROMSGROVE GENERAL HOSPITAL, Worcestershire. (423 Beds.) HOUSE OFFICER in Obstetrics and Gynæcology required. 38 maternity, 18 gynæcological beds. Post vacant now. Recognised for D.Obst.R.C.O.G. and for M.R.C.O.G. in gynæcology and obstetrics.

Applications, with the names of 3 referees, to the Hospital Secretary.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. BURY GENERAL HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER in Casualty and Orthopædics. This post is recognised for the F.R.C.S.

Full details, including nationality, age, qualifications, and experience, with the names of 2 referees, should be forwarded to—

H. WILKINSON, Group Secretary.

Bury General Hospital, Bury, Lancs.

CAMBRIDGE. ADDENBROOKE'S HOSPITAL. Medical REGISTRAR (non-resident) for 1 year in first instance, vacant mid-August, renewable for second year.

Apply, with full particulars and names of 3 referees, to Secretary by 10th July.

CAMBRIDGE (near). FULBOURN HOSPITAL. Senior HOUSE OFFICER (resident or non-resident). Previous psychiatric experience not required. This Hospital of 974 Beds is linked with the Cambridge University Department of Psychology and Addenbrooke's Hospital, and provides a basic psychiatric training leading to the D.P.M.

Applications, stating age, qualifications and experience with names of 2 referees, should be sent to—

Dr. D. H. CLARK, Medical Superintendent.

Fulbourn Hospital, near Cambridge.

CAMBRIDGE. THE UNITED CAMBRIDGE HOSPITALS. Locum ANÆSTHETIC REGISTRAR required at Addenbrooke's Hospital for 1 month from 10th August.

Apply, with full particulars and names of referees, to Secretary by 10th July.

CANTERBURY. KENT AND CANTERBURY HOS-PITAL. (277 Beds.) GYNÆCOLOGICAL HOUSE SURGEON required at Highland Court Annexe, a unit of 25 gynæcological beds situated 3 miles from the above Hospital, with all ancillary services available. Recognised for M.R.C.O.G. 6 months appointment. Post now vacant. National Health Service salary and conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CANTERBURY. KENT AND CANTERBURY HOS-PITAL. (277 Beds.) The post of SENIOR HOUSE PHYSICIAN becomes vacant early in August, 1957. Salary £745 p.a., with National Health Service conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CARDIFF. ST. DAVID'S HOSPITAL. Senior House OFFICER (may be Locum) required for Accident Unit at above Hospital.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARLISLE. CUMBERLAND INFIRMARY. (331 Beds.) SENIOR HOUSE OFFICER (general surgery) required. Recognised for F.R.C.S. examination.

Forms of application may be obtained from the Group Secretary, Cumberland Infirmary, Carlisle.

CARSHALTON, SURREY. QUEEN MARY'S HOS-PITAL FOR CHILDREN. (General Children's Hospital of 720 Beds.) Whole-time ANÆSTHETIC REGISTRAR. The surgery practice of the Hospital includes emergency, orthopædic, E.N.T., and general surgery, and there is a special Surgical Unit in association with the Hospital for Sick Children, Great Ormond-street. The post is recognised by the Faculty of Anæsthetists. Applicants are invited to visit the Hospital by appointment with the Physician-Superintendent.

Applications, on forms obtainable from the Group Secretary, should be submitted by 20th July, 1957.

CARSHALTON, SURREY. QUEEN MARY'S HOS-PITAL FOR CHILDREN. Locum ANÆSTHETIC REGISTRAR required from 29th July, 1957, for an indefinite period.

Apply Group Secretary (Wallington 6635, Ext. 27).

CARSHALTON, SURREY. ST. HELIER HOSPITAL. SENIOR HOUSE OFFICER (Chest Unit), medical and surgical duties. Vacant 1st August.

Applications, stating age, qualifications and experience, with copies of testimonials and the names of 2 referees, should be sent to the Group Secretary at above address.

CHELMSFORD HOSPITALS. Applications are invited for the post of RESIDENT ANÆSTHETIST (Senior House Officer) to large surgical units.

Applications, stating age, qualifications, and experience, with recent testimonials, should be sent to the Secretary, Chelmsford Hospital Management Committee, London-road, Chelmsford.

CHELMSFORD, ESSEX. BROOMFIELD HOSPITAL. Required, experienced Locum Tenens SENIOR REGISTRAR for 1 year, full residence or only when on duty. Unit has 312 Beds for the treatment of pulmonary tuberculosis in adults. Tuberculous and non-tuberculous thoracic surgery, chest clinics, and mass radiography.

Apply Physician-Superintendent.

CHEPSTOW, MONMOUTHSHIRE. ST. LAWRENCE HOSPITAL. (127 plastic surgery, 50 orthopædic beds.) PLASTIC SURGERY, JAW INJURIES AND BURNS CENTRE. SENIOR HOUSE OFFICER in Plastic Surgery required. There are 2 residents in plastic surgery and 1 in orthopædics. Post tenable 6 or 12 months as desired, and candidates experienced in another specialty wishing to gain plastic surgery experience will be considered. Salary £819 10s., less £150 board-residence.

Write, quoting 2 referees, to T. A. JONES, Group Secretary. 64, Cardiff-road, Newport, Mon.

CHESTERFIELD. WALTON HOSPITAL. (146 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (chest diseases) required. Married accommodation available. All forms of major thoracic surgery are undertaken at this Hospital. Some clinic work would be associated under the supervision of the Consultant concerned. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 8th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

CHICHESTER. ROYAL WEST SUSSEX HOSPITAL. CHICHESTER GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. RESIDENT MEDICAL REGISTRAR required August or September for duty primarily at Royal West Sussex Hospital (202 Beds) with care, under Consultant Physicians, of 60 adult medical and 10 children's beds; also assisting Dermatologist and Physical Medicine Physician. Whitley Council terms and National Health Service superannuation regulations. Salary £935 first year, £1061 10s. second, each less £170 for residence. Candidates may visit Hospital. Canvassing disqualifies.

Forms, from Group Secretary, 174, Broyle-road, Chichester, to be submitted within 14 days.

CHICHESTER, SUSSEX. GRAYLINGWELL HOS-PITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of SENIOR REGISTRAR (whole-time) at the above Hospital. Applicants should have had wide psychiatric experience and possession of the D.P.M. or its equivalent is essential. The Hospital has an admission-rate of 1100 a year and there are 3 active outpatient clinics. There are Departments of Research, Neurology, Psychology and Social Service, and there is a modern Electro-encephalographic Unit.

Application forms, for which a stamped addressed envelope should be supplied, may be obtained from the Group Secretary, Graylingwell Hospital, Chichester, and 6 copies should be returned to him duly completed, not later than 14 days after the appearance of this advertisement.

CHICHESTER, SUSSEX. ST. RICHARD'S HOSPITAL. Applications are invited for the post of HOUSE PHYSICIAN (recognised for pre-registration) for 6 months only in the first instance. Vacant middle of August, 1957.

Applications, stating age, qualifications and experience, and giving names of 2 persons to whom reference may be made, should be sent to the Surgeon-Superintendent.

COLCHESTER GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for :—

Essex County Hospital, Colchester, Essex (185 Beds)

Post of HOUSE OFFICER (surgical). First, second, third or pre-registration post, tenable for 6 months. Recognised for F.R.C.S.

Post of HOUSE PHYSICIAN (first, second, third or pre-registration post), tenable for 6 months.

Post of Locum Tenens ANÆSTHETIC REGISTRAR. For 2 weeks commencing 8th July, 1957, for duties at Essex County Hospital and other hospitals in Group.

Essex County Hospital (19 gynæcological beds)
Colchester Maternity Hospital (22 obstetric beds)

Post of HOUSE OFFICER (Male or Female), obstetric and gynæcological. First, second, third or pre-registration post; tenable for 6 months.

Black Notley Hospital, Braintree, Essex (516 Beds)

Post of HOUSE SURGEON (first, second, third or pre-registration post). Includes duties in general surgical and gynæcological wards. Recognised for F.R.C.S.

Applications, with copies of 3 testimonials, to Group Secretary, Colchester Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

COULSDON, SURREY. CANE HILL HOSPITAL. Applications are invited for appointment of JUNIOR HOSPITAL MEDICAL OFFICER (whole-time). Cane Hill is a large Psychiatric Hospital serving mainly South London and undertakes postgraduate teaching in association with the Institute of Psychiatry. Previous psychiatric experience is not essential and the holder of the post will be given all facilities for study for the D.P.M. Registrars who have completed their term of appointment and desire further experience with a view to promotion are also invited to apply. Residential accommodation available if required for single man or woman.

Applications, stating age, qualifications and experience, with names of 3 referees, to Physician-Superintendent as soon as possible. The Hospital may be visited by appointment.

CUCKFIELD HOSPITAL, Cuckfield, Sussex. Junior HOUSE SURGEON (Obstetric and Gynæcological Department), vacant about 25th July, 1957. Pre-registration appointment, also recognised for training for Diploma and Membership.

Applications, stating age, nationality, qualifications and experience, to the Group Secretary, Mid-Sussex Hospital Management Committee.

CREWE AND DISTRICT MEMORIAL HOSPITAL (140 Beds) AND BARONY HOSPITAL, NANTWICH (300 Beds). SENIOR HOUSE OFFICER (gynæcology and obstetrics) required. Salary and conditions in accordance with Whitley Council scale.

Applications, stating age, qualifications, and experience, together with names of 2 referees, to Group Secretary, South Cheshire Hospital Management Committee, Barony Hospital, Nantwich, Cheshire.

CREWE AND DISTRICT MEMORIAL HOSPITAL (140 Beds) AND BARONY HOSPITAL, NANTWICH (300 Beds). Locum SENIOR HOUSE OFFICER (gynæcology and obstetrics) required. Salary and conditions in accordance with Whitley Council scale.

Applications, stating age, qualifications and experience, together with names of 2 referees, to Group Secretary, South Cheshire Hospital Management Committee, Barony Hospital, Nantwich, Cheshire.

CROYDON. GENERAL HOSPITAL. (200 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. CASUALTY OFFICER (Senior House Officer) resident. Post vacant now. Recognised for Final F.R.C.S. examination. There is a Registrar in charge of Department.

Application forms obtainable from GEORGE A. PAINES, Group Secretary, Hospital Management Committee, General Hospital, London-road, Croydon.

CROYDON. MAYDAY HOSPITAL. (611 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum Tenens CASUALTY OFFICER (Junior Hospital Medical Officer) required 3rd–28th August.

Applications in writing, together with names of 2 referees, to—
GEORGE A. PAINES, Group Secretary,
Hospital Management Committee.
General Hospital, London-road, Croydon.

CROYDON. QUEEN'S HOSPITAL. (450 Beds.) Geriatric UNIT. CROYDON GROUP HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (resident). Suitable for candidate reading for higher qualification. Post vacant now.

Application forms obtainable from GEORGE A. PAINES, Group Secretary, Hospital Management Committee, General Hospital, London-road, Croydon, to be returned within 14 days.

DERBY. DERBYSHIRE CHILDREN'S HOSPITAL. (86 Beds.) HOUSE SURGEON (pre-registration) or SENIOR HOUSE OFFICER required. Vacant immediately. Recognised for D.C.H.

Applications, stating full particulars, together with copies of 2 recent testimonials, to be sent as soon as possible to Secretary.

DERBY. DERBYSHIRE CHILDREN'S HOSPITAL. (86 Beds.) SENIOR HOUSE OFFICER (pædiatrics) required, vacant 15th August, 1957. Recognised for D.C.H.

Applications, with 2 names for reference, should be sent as soon as possible to Hospital Secretary.

DERBY. DERBYSHIRE HOSPITAL FOR WOMEN, FRIAR GATE. HOUSE SURGEON (pre-registration) or SENIOR HOUSE OFFICER (gynæcology) required 28th August. Recognised for M.R.C.O.G. in gynæcology only.

Apply, stating full details with copies of 2 recent testimonials, to Group Secretary, Derbyshire Royal Infirmary, Derby.

DERBY. DERBYSHIRE ROYAL INFIRMARY. (416 Beds.) SENIOR HOUSE OFFICER (casualty) required 1st August or earlier. Recognised for periods of 6 months casualty training for F.R.C.S.

Apply, stating age, experience, and 2 names for reference, to Secretary.

DOUGLAS. NOBLE'S ISLE OF MAN HOSPITAL. (160 Beds.) Applications are invited for the post of HOUSE PHYSICIAN, approved for Pre-registration Service. Establishment of 4 House Officers. Post becomes vacant mid-August, 1957, and offers varied experience. National Health Service salary and conditions of service.

Apply to the Secretary, Noble's Isle of Man Hospital, Douglas.

DUDLEY, STOURBRIDGE AND DISTRICT HOSPITAL GROUP, BIRMINGHAM REGION.

The Guest Hospital, Dudley (154 Beds)
SENIOR HOUSE OFFICER (casualty). Post now vacant.

Wordsley Hospital, near Stourbridge (478 Beds)
HOUSE OFFICER (surgical), pre-registration. Post vacant 20th July, 1957.

The Corbett Hospital, Stourbridge (114 Beds)
HOUSE OFFICER (surgical), pre-registration. Post vacant 6th July, 1957.

Apply, Group Secretary, Guest Hospital, Dudley.

EPPING. ST. MARGARET'S HOSPITAL. House SURGEON (pre- or post-registration) to very busy General Surgical Unit. Hospital within easy reach of Central London. Post vacant 1st July, 1957.

Applications, with copies of testimonials, including 1 from medical school, to be sent immediately to the Group Secretary, Epping Group Hospital Management Committee, "Oak Cottage," The Plain, Epping, Essex.

EPPING. ST. MARGARET'S HOSPITAL. Senior House OFFICER (chest diseases and casualty) required for busy General Hospital (421 Beds). Duties to include supervision of 40 Tuberculosis Beds and a proportion of relief casualty duty. Good experience in modern methods of treatment.

Applications, with copies of 2 recent testimonials, to be sent to the Group Secretary, Epping Group Hospital Management Committee, Oak Cottage, The Plain, Epping, Essex, by 10th July, 1957.

GREENOCK. RAVENSCRAIG (MENTAL AND GEN-ERAL) HOSPITAL. (472 Beds.) JUNIOR HOSPITAL MEDICAL OFFICER. Resident post. Mental and general experience to be gained. Hospital is recognised as a training centre for the D.P.M. examination.

Applications, in writing, to the Physician-Superintendent as soon as possible.

EAST ANGLIAN REGIONAL HOSPITAL BOARD. ANÆSTHETIC REGISTRAR, United Norwich Hospitals. Main hospital Norfolk and Norwich. Recognised for F.F.A.R.C.S. and D.A. Appointment for 1 year, renewable for second year.

Applications, stating age, experience and names of 3 referees, to the Board's Senior Administrative Medical Officer, 117, Chesterton-road, Cambridge, by 8th July, 1957. Candidates invited to visit hospitals by direct arrangement with Hospital Management Committee Secretary, Norfolk and Norwich Hospital.

GLASGOW NORTH-EASTERN MENTAL HOSPITALS BOARD OF MANAGEMENT require SENIOR HOUSE OFFICER (resident) for Woodilee Mental Hospital, Lenzie (1272 Beds). Salary £819 10s. p.a. Outpatient Clinic. Facilities for taking D.P.M.

Applications, stating age, training, experience, qualifications, and names of 2 referees, to the Medical Superintendent.

GLASGOW. ROYAL HOSPITAL FOR SICK CHILDREN, YORKHILL, GLASGOW. Applications are invited for the post of SENIOR HOUSE OFFICER (resident) in Surgical Pædiatrics at the above Hospital. National Health Service salary and conditions of service.

Applications, with names of 3 referees, to be lodged with the Secretary, Board of Management for Glasgow and District Children's Hospitals, 86, St. Vincent-street, Glasgow, C.2.

GLASGOW ROYAL INFIRMARY. Senior House Officer in Anæsthetics. Duties at above Infirmary.

Write, giving 3 names for reference, not later than 12th July, 1957, to the Secretary and Treasurer, Board of Management for Glasgow Royal Infirmary and Associated Hospitals, 135, Buchanan-street, Glasgow, C.1.

GLASGOW ROYAL INFIRMARY. Senior House Officer in Pathology (2 vacancies). Duties at above Infirmary.

Write, giving 3 names for reference, not later than 12th July, 1957, to the Secretary, Board of Management for Glasgow Royal Infirmary and Associated Hospitals, 135, Buchanan-street, Glasgow, C.1.

GLASGOW, N.W. RUCHILL HOSPITAL. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER in the Chest Department (Medical Unit). The department consists of 200 Beds for the treatment of pulmonary tuberculosis and other diseases of the chest. There is attached to the department a Thoracic Surgical Unit of 60 Beds. Facilities are available for postgraduate study and research.

Applications, stating age, qualifications and experience, along with names of 2 referees, to Physician-Superintendent, not later than 15th July.

GLASGOW. VICTORIA HOSPITALS BOARD OF MANAGEMENT. Ear, Nose and Throat—SENIOR HOUSE OFFICER required (resident Mearnskirk Hospital, Newton Mearns, near Glasgow) with duties at Mearnskirk Hospital and Victoria Infirmary, Glasgow.

Applications, with names of 3 referees, to the Secretary, Board of Management for Glasgow Victoria Hospitals, 24, St. Vincent-place, Glasgow, C.1.

GUILDFORD. ROYAL SURREY COUNTY HOSPITAL. (233 Beds.) CASUALTY OFFICER required. Post recognised for F.R.C.S. examination. Grading Senior House Officer. 2 Casualty Officers employed who share the work of the department which is part of the Orthopædic and Traumatic Unit. Regular instruction given in traumatic surgery and Casualty Officers take part in the work of fracture clinics. Post vacant mid-July.

Applications, with copies of 2 testimonials, to Hospital Secretary as soon as possible.

GUILDFORD. ROYAL SURREY COUNTY HOSPITAL. RESIDENT HOUSE SURGEON for Orthopædic and Traumatic Unit. The post, which is now vacant, is tenable for 6 months. It is open to pre-registration candidates and recognised for the F.R.C.S. examination. The post affords good experience in traumatic surgery.

Applications, with copies of 3 testimonials, should be sent to the Hospital Secretary.

GRIMSBY GROUP OF HOSPITALS. Sheffield Regional HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT REGISTRAR (obstetrics and gynæcology) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 8th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

HARROGATE AND DISTRICT GENERAL HOSPITAL, HARROGATE, YORKSHIRE. (253 Beds.) JUNIOR HOSPITAL MEDICAL OFFICER in Casualty and Orthopædic Surgery. Recognised for F.R.C.S. House available on reasonable rental, for married person, in the near vicinity of the Hospital. Resident quarters available in the Hospital for single person.

Applications, with the names of 2 referees, should be addressed to the Hospital Secretary as soon as possible.

HASTINGS. ST. HELEN'S HOSPITAL. (493 Beds.) SENIOR HOUSE OFFICER in Obstetrics required. 40-Bedded unit. Post recognised for D.Obst.R.C.O.G. Vacant 31st July.

Apply to Administrator, at the Hospital, by 6th July, 1957.

HEMEL HEMPSTEAD, HERTFORDSHIRE. WEST HERTS HOSPITAL. HOUSE SURGEON (pre-registration) required.

Applications, giving full details and copies of recent testimonials, should be sent to the Hospital Secretary at once.

HITCHIN HOSPITALS, Hitchin, Hertfordshire. Surgical REGISTRAR required 1st September, 1957, at above hospitals, for 1 year in first instance. The post provides valuable all-round surgical experience and is recognised for F.R.C.S. The Hospitals may be visited by direct appointment (Hitchin 3701).

Application forms obtainable from Secretary, Luton and Hitchin Group Hospital Management Committee, St. Mary's Hospital, Luton, Beds, and returnable by 15th July, 1957.

HAROLD WOOD HOSPITAL, Harold Wood, Essex (near London). (415 Beds.) SENIOR HOUSE OFFICER (anæsthetics), resident. Main general and casualty hospital in Group. Recognised for D.A. and F.F.A.R.C.S.

Apply, giving full details, to the Hospital Secretary (Tel. : Ingrebourne 2881).

HOVE. THE LADY CHICHESTER HOSPITAL, New Church-road, HOVE, SUSSEX. (70 Beds.) Applications invited for post of JUNIOR HOSPITAL MEDICAL OFFICER at the above Hospital, a Neurosis Centre for men, women, and children, with Outpatients Department. The post is resident and accommodation is only available for a single person. Salary £852 10s. p.a., rising by annual increments to £1182 10s. p.a., less a charge of £170 p.a. for board-residence. Conditions of service in accordance with national recommendations.

Applications, stating nationality, age, sex, qualifications, and experience, together with the names of 3 referees, to the Secretary, Hospital Management Committee, St. Francis Hospital, Haywards Heath, Sussex, as soon as possible.

HUDDERSFIELD. MILL HILL HOSPITAL. (132 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT MEDICAL OFFICER (Junior Hospital Medical Officer grade—£775–£50–£1075 p.a.), at the above Hospital. The present allocation of beds is 28 for infectious diseases and 104 for geriatric patients.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Group Secretary,
Huddersfield Hospital Management Committee.

The Royal Infirmary, Huddersfield.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required, to commence duty immediately. The post is recognised as a pre-registration appointment and for the F.R.C.S. Salary in accordance with national scale.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Secretary to the Management Committee.
The Royal Infirmary, Huddersfield.

HULL A GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER in the E.N.T. Department of the Victoria Hospital for Sick Children and the Hull Royal Infirmary. The post, which is now vacant, is recognised for the F.R.C.S. and D.L.O.

Applications, with testimonials, should be sent to the Hospital Secretary, Victoria Hospital for Sick Children, Park-street, Hull.

HUNTINGDON COUNTY HOSPITAL. Applications are invited for the post of HOUSE OFFICER (medical). Post recognised for pre-registration purposes. The selected candidate will be required to look after medical and pædiatric cases and may be called upon to give emergency anæsthetics. Post vacant end July.

Apply, with full particulars and names of 2 referees, to Secretary, County Hospital, Huntingdon.

HUNTINGDON COUNTY HOSPITAL. Applications are invited for the post of HOUSE OFFICER (surgical), vacant now. Post recognised for pre-registration purposes.

Apply, with full particulars and names of 2 referees, to Secretary, County Hospital, Huntingdon.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea ROAD WING. (356 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (Resident Anæsthetist). The post, which becomes vacant on 1st July, 1957, and is normally of 1 years duration, is recognised for the D.A. and the F.F.A.R.C.S. examinations.

Applications, stating age and nationality, together with recent testimonials, to Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea ROAD WING. (356 Beds.) Applications are invited for the post of HOUSE SURGEON to the Senior Consultant General Surgeon. The post is recognised for pre-registration and for the F.R.C.S. examinations.

Applications, with copies of recent testimonials, to Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL. Heath ROAD WING. (280 Beds.) Applications invited for the post of SENIOR HOUSE OFFICER to the Fracture and Orthopædic Department. Vacant early July, and recognised for R.C.S. examinations.

Applications, with full details, and copies of recent testimonials, to Hospital Secretary.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. House SURGEON required. Duties include plastic surgery and orthopædic surgery (58 orthopædic beds and 18 plastic surgery beds). Large outpatient clinics.

Applications, stating age, qualifications, nationality, and copies of up to 3 testimonials, to Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 9th July.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. Senior HOUSE OFFICER (resident), E.N.T. Department. Post offers good experience. 3 to 4 operating sessions per week. Previous E.N.T. experience desirable but not essential.

Applications, stating age, nationality, qualifications and experience, with copies of up to 3 testimonials, to Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 15th July.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. (South MIDDLESEX HOSPITAL SURGICAL ANNEXE.) HOUSE SURGEON (pre-registration) required—Surgical Annexe of West Middlesex Hospital at South Middlesex Hospital (30 Beds). Duties include some assistance on Infectious Diseases Unit. Post vacant now.

Applications, stating age, qualifications and experience, with copies of up to 2 recent testimonials, to Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 8th July.

LANCASTER MOOR HOSPITAL, Lancaster. (Regional MENTAL HOSPITAL.) Applications invited for the post of RESIDENT JUNIOR HOSPITAL MEDICAL OFFICER (Male or Female). Unfurnished flat available for married applicants; furnished quarters for single persons. Hospital recognised for D.P.M. and facilities granted for attending neighbouring universities. All modern methods of investigation and treatment carried out. Hospital serving N. Lancashire and Lake District. Post for initial period of 4 years, but renewable if services satisfactory.

Apply Medical Superintendent.

LANCASTER. ROYAL LANCASTER INFIRMARY. (240 Beds.) SENIOR HOUSE OFFICER (casualty). The successful applicant will work with the Specialist Orthopædic Unit. The post is recognised for F.R.C.S.

Applications, with names of 2 referees, to be addressed to the Group Secretary. Royal Lancaster Infirmary, Lancaster.

LANCASTER. ROYAL LANCASTER INFIRMARY. (240 Beds.) SENIOR HOUSE OFFICER (medical). Duties include care of acute cases under the supervision of 2 Consultant Physicians and attendance at Consultative Clinics. The post is normally tenable for 1 year. Post vacant now.

Applications, with names of 2 referees, to be addressed to the Group Secretary, Royal Lancaster Infirmary, Lancaster.

LANCASTER. ROYAL LANCASTER INFIRMARY. (240 Beds.) RESIDENT HOUSE OFFICER (medical), pre-registration post. Duties include care of acute cases under the supervision of 2 Consultant Physicians and attendance at Consultative Clinics. Post vacant shortly; tenable for 6 months.

Applications, with names of 2 referees, to Secretary (M), Royal Lancaster Infirmary, Lancaster.

LANCASTER. ROYAL LANCASTER INFIRMARY. (240 Beds.) RESIDENT HOUSE OFFICER (obstetrics and gynæcology), pre-registration post. Successful applicant will be attached to the Specialist Unit. Post vacant shortly, tenable for 6 months, and recognised for M.R.C.O.G. and D.Obst.R.C.O.G.

Applications, with names of 2 referees, to the Group Secretary (OG), Royal Lancaster Infirmary, Lancaster.

LEEDS REGIONAL HOSPITAL BOARD. Senior Regis-TRAR in Ophthalmology, Hull A Group with additional duties as required in Hull B and East Riding Groups (34 eye beds, 5430 new and 19,305 total outpatients annually). Non-resident.

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 18th July.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

Anæsthetics

Hull A, Hull B and East Riding Groups. Recognised for the F.F.A.R.C.S. Duties may include thoracic anæsthesia. Non-resident. Vacant October.

General Medicine

(i) Bradford A Group. Duties mainly at the Bradford Royal Infirmary (110 general medical beds). Resident. Vacant October.

(ii) Huddersfield Group (60 general medical beds). Non-resident.

General Surgery

Bradford A Group. Mainly at the Bradford Royal Infirmary (100 surgical beds). Recognised for F.R.C.S. Vacant October.

Infectious Diseases

Leeds Road Hospital, Bradford (160 infectious diseases beds). Resident.

Ophthalmology

Huddersfield Group (23 eye beds and 1500 new outpatients annually). Non-resident.

Orthopædic Surgery

Harrogate General Hospital (38 orthopædic beds). Non-resident.

Psychiatry

St. James's Hospital, Leeds. Offers special opportunity for experience with neurotic and psychosomatic patients. Vacant October.

Applications, stating age, qualifications, and details of present and previous appointments, with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 11th July, 1957.

LEEDS. UNITED LEEDS HOSPITALS/LEEDS REGIONAL HOSPITAL BOARD. REGISTRAR in Thoracic Surgery. First year normally at the Regional Thoracic Centre, Pinderfields General Hospital, Wakefield (56 Beds), which is under the charge of the Consultants to the Teaching Hospital. Second year if possible at the General Infirmary at Leeds. Recognised for F.R.C.S.

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 18th July, 1957.

LEICESTER GENERAL HOSPITAL (445 Beds) AND ROYAL INFIRMARY (492 Beds). SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time NON-RESIDENT REGISTRAR (pædiatrics) required 1st September. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 8th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. LIVERPOOL ROYAL INFIRMARY. Applications are invited for the resident post of SENIOR CASUALTY OFFICER (Registrar grade) for the period 1st September, 1957–30th September, 1958. Annual re-appointment thereafter until completion of the normal period of training will be considered without need for further application.

Apply by 13th July on form obtainable from the Secretary, The United Liverpool Hospitals, 80, Rodney-street, Liverpool, 1.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. Applications are invited for temporary appointment for 1 year from 1st October, 1957, to 30th September, 1958, to the post of SENIOR REGISTRAR in Anæsthetics during the absence abroad of the existing holder. The duties of the post will be undertaken mainly in the general hospitals of the Group.

Apply by 13th July on form obtainable from the Secretary, 80, Rodney-street, Liverpool, 1.

LINCOLN COUNTY HOSPITAL, Sewell-road, Lincoln. Applications are invited for the post of SENIOR HOUSE OFFICER in Surgery for the 6 months commencing 20th July, 1957.

Applications to— R. W. HOWICK, Secretary,
Lincoln No. 1 Hospital Management Committee.

LINCOLN COUNTY HOSPITAL. (200 Beds.) Applications are invited from pre-registration candidates for appointment as HOUSE SURGEON for 6 months to be followed if satisfactory by appointment as House Physician for a further 6 months.

Full particulars should be sent to—
R. W. HOWICK, Group Secretary.

LINCOLN COUNTY HOSPITAL. (200 Beds.) Applications are invited from pre-registration candidates for appointment as HOUSE PHYSICIAN for a period of 6 months.

Full particulars should be sent to—
R. W. HOWICK, Secretary.

MACCLESFIELD. PARKSIDE HOSPITAL MANAGEMENT COMMITTEE. (1650 Beds.) Applications are invited for the post of RESIDENT REGISTRAR in Psychiatry. Facilities for attending the course for the D.P.M. at Manchester University will be granted and the Hospital is recognised by the Conjoint Board for the purpose of the D.P.M. The Hospital may be visited by appointment.

Applications, with the names of 2 referees, to be sent to the Medical Superintendent, Parkside Hospital, Macclesfield, Cheshire, by 20th July, 1957.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the Ophthalmic Department of the above Hospital. Post vacant 17th August, 1957. The Hospital is recognised by the Examining Board for the F.R.C.S. and the D.O. Salary £819 10s. a year, less £150 a year for residential emoluments.

Applications should be forwarded, as soon as possible, to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Church-street, Maidstone.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the E.N.T. Department of the above Hospital. Post vacant 1st August, 1957. There are 55 E.N.T. beds and 6 specialist operating sessions each week. Valuable experience is available, and the post is recognised for the purpose of the F.R.C.S. and the D.L.O. Salary will be £819 10s. a year, less £150 a year for residential emoluments.

Applications to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Maidstone, Kent.

MAIDSTONE. PRESTON HALL HOSPITAL, British LEGION VILLAGE, MAIDSTONE, KENT. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER at the above Hospital, which contains 330 Beds for treatment of pulmonary tuberculosis and other chest diseases and includes a major Thoracic Surgical Unit. Candidates should have had experience in general medicine and in the treatment of pulmonary tuberculosis in adults. Salary £852 10s.–£55–£1182 10s. p.a., national scale and conditions.

Applications, stating age, qualifications, and experience with relevant dates, together with names and addresses of 2 referees, to be sent to the Group Secretary by 27th July, 1957.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. CASUALTY OFFICER (Senior House Officer). Recognised for F.R.C.S. Salary £819 10s. a year, less £150 a year for board and lodging. Post vacant now.

Applications to the Administrative Officer at the Hospital.

MANCHESTER, 8. CRUMPSALL HOSPITAL. Applications are invited for the post of RESIDENT CLINICAL PATHOLOGIST (Senior House Officer grade). Tenable for 1 year and presents opportunities for gaining experience in all branches of clinical pathology. Previous experience in pathology not essential.

Applications, with names of 2 referees, by 8th July, 1957, to Group Secretary, North Manchester Hospital Management Committee, Crumpsall Hospital, Manchester, 8.

MANCHESTER REGIONAL HOSPITAL BOARD invites applications for post of RESIDENT SURGICAL REGISTRAR to Macclesfield District Group hospitals, main duties Infirmary Branch, Macclesfield Hospital. Hospital recognised for F.R.C.S. regulations.

Apply immediately, with names and addresses of 2 referees, to Group Secretary, "Willerby House," Cumberland-street, Macclesfield.

MANCHESTER REGIONAL HOSPITAL BOARD. Salford HOSPITAL MANAGEMENT COMMITTEE. Applications invited for post of NON-RESIDENT REGISTRAR in Psychiatry, vacant 1st August, 1957.

Applications, together with names of 2 referees, to be sent to Group Secretary, Salford Royal Hospital, Salford, 3, before 6th July, 1957.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the post of Locum REGISTRAR in General Medicine to the West Manchester Hospital Management Committee. Primarily for duty at Park Hospital, Davyhulme, but with duties at other Group Hospitals.

Forms from Secretary, Park Hospital, Davyhulme.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the post of REGISTRAR in Thoracic Surgery to the Blackpool and Fylde Group of hospitals with main duties at the Victoria Hospital, Blackpool. The post available from early October is recognised for the F.R.C.S. and offers a sound experience gained with the 2 Consultant Thoracic Surgeons who are responsible for the thoracic surgery in the Northern part of the Manchester Region. Non-resident post but residential accommodation is available, if required, for single applicants.

Applications, stating age, qualifications and experience together with the names and addresses of 2 referees, should be sent to the Group Secretary, Victoria Hospital, Blackpool.

MANCHESTER REGIONAL HOSPITAL BOARD. Applications are invited for the resident post of REGISTRAR in Obstetrics and Gynæcology to the Wigan and Leigh Group of hospitals. Post recognised for M.R.C.O.G. Main duties at Billinge Hospital, Orrell, near Wigan.

Applications to Secretary, Wigan and Leigh Hospital Management Committee, Knowsley House, Wigan.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for 2 REGISTRAR posts in Radiotherapy at the Christie Hospital and Holt Radium Institute, Manchester, 20.

Applications, with full details, to be forwarded to the Group Secretary, Withington Hospital, Manchester, 20, immediately.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. The Board invite applications from registered practitioners for the post of RESIDENT SURGICAL OFFICER (Registrar grade) at Withington Hospital. The Resident Surgical Officer is appointed to 1 or more surgical firms and is responsible for surgical urgencies as part of his duties. Candidates must hold the F.R.C.S.

Applications, with full details, to be forwarded to the Group Secretary, Withington Hospital, Manchester, 20, immediately.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. The Board invite applications from registered practitioners for the post of REGISTRAR in Plastic Surgery at the Wythenshawe Hospital, which is a general hospital with 71 plastic surgery beds.

Applications, stating age, qualifications present post and names of 2 referees, to be forwarded to the Group Secretary, Withington Hospital, Manchester, 20, immediately.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the post of REGISTRAR in E.N.T. Surgery to the Blackpool and Fylde Group of hospitals with main duties at the Victoria Hospital, Blackpool (353 Beds). There are 2 Consultant E.N.T. Surgeons and the appointment provides the opportunity of gaining a sound experience in this specialty.

Applications, stating age, qualifications, experience, and the names and addresses of 3 referees, should be sent to the Group Secretary, Blackpool and Fylde Hospital Management Committee, Victoria Hospital, Blackpool, not later than 13th July, 1957.

MANCHESTER. UNITED MANCHESTER HOSPITALS AND MANCHESTER REGIONAL HOSPITAL BOARD. SENIOR REGISTRAR in Surgery, to commence as soon as possible. Whole-time non-resident appointment for 12 months, renewable, commencing at the Manchester Royal Infirmary in the Surgical Professorial Unit. Applicants must possess a higher qualification. Arrangements may eventually be made for the successful candidate to transfer to 1 of the Manchester Regional Hospitals to continue training.

Application form obtainable from the undersigned, to be returned by 20th July, 1957.

F. J. CABLE, Secretary to the Board of Governors.
United Manchester Hospitals, Manchester Royal Infirmary, Manchester, 13.

MANCHESTER. UNITED MANCHESTER HOSPITALS. SAINT MARY'S HOSPITALS. FIRST ASSISTANT (Registrar grade). There will very shortly be a second vacancy in this grade and applications are invited from suitable candidates (salary at national scale). There is an establishment of 4 "First Assistants"—2 of Senior Registrar grade and 2 of Registrar grade. Initially the appointment will be for 1 year, renewable normally for a second year. The post is non-resident. The duties include very considerable clinical responsibility for obstetrical and gynæcological cases, including cases dealt with in the "Flying-squad" service. The supervision of House Officers and some teaching of undergraduate medical students are also involved. Candidates must therefore have had full previous experience in obstetrics and gynæcology. A higher qualification is desirable.

Forms of application may be obtained from the undersigned. The closing date is 16th July, 1957.

A. R. WISE, General Superintendent.
Saint Mary's Hospitals, Whitworth Park, Manchester, 13.

MANCHESTER, 20. WITHINGTON HOSPITAL. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT CLINICAL PATHOLOGIST (Senior House Officer grade), vacant on 2nd September, 1957. Previous experience in pathology not essential, the post affording opportunities for gaining experience in all branches of clinical pathology.

Applications, stating age, qualifications, present post, experience, and the names of 2 referees, to be forwarded to the Group Secretary, Withington Hospital, Manchester, 20.

MANCHESTER, 20. WITHINGTON HOSPITAL. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (surgical) including casualty duties, vacant immediately. The post is recognised for F.R.C.S. and possession of the primary F.R.C.S. will be an advantage. The Hospital is recognised by the Manchester University for the teaching of undergraduate students.

Applications, with full details, to the Group Secretary, Withington Hospital, immediately.

MANCHESTER, 23. WYTHENSHAWE HOSPITAL. SOUTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of CASUALTY OFFICER (Senior House Officer grade) at the above-named Hospital. This post is recognised by the Royal College of Surgeons.

Applications, stating age, qualifications, present post, experience, and names of 2 referees, to be forwarded to the Group Secretary, Withington Hospital, within 7 days of the appearance of this advertisement.

MANCHESTER. SOUTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics) with duties in the South Manchester Group. This post is recognised by the Royal College of Surgeons for the F.F.A.R.C.S. and for the D.A.

Applications, stating age, present post, experience and the names of 2 referees, to be forwarded immediately to the Group Secretary, Withington Hospital, Manchester, 20.

MARKET DRAYTON (near), SHROPSHIRE. CHESHIRE JOINT SANATORIUM. (305 Beds.) RESIDENT MEDICAL OFFICER (Junior Hospital Medical Officer or Senior House Officer according to experience). The post offers exceptional experience in the treatment of pulmonary tuberculosis.

Applications to the Medical Superintendent at the Sanatorium.

MIDDLESBROUGH. GENERAL HOSPITAL, Ayresome Green-lane. (309 Beds.) TEES-SIDE HOSPITAL MANAGEMENT Committee. Applications are invited for the appointment of SENIOR HOUSE OFFICER (casualty) at the above Hospital. The appointment offers excellent experience in a very busy department, for which there is a whole-time Senior Casualty Officer and 2 whole-time Senior House Officers.

Applications, stating full details and giving names of 2 referees, should be sent, as soon as possible, to the Hospital Secretary.

MIDDLESBROUGH. GENERAL HOSPITAL, Ayresome Green-lane. (309 Beds.) TEES-SIDE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER (orthopædics). The appointment is recognised for the F.R.C.S. examination and will include some duties in the Casualty Department, which is under the supervision of a full-time Senior Casualty Officer.

Applications, stating age, qualifications and experience, together with the names of 2 referees, should be sent, as soon as possible to the Hospital Secretary.

MIDDLESBROUGH. NORTH ORMESBY HOSPITAL. (180 Beds.) TEES-SIDE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of HOUSE OFFICER (surgery) at the above-named Hospital. The appointment, which is recognised for Pre-registration Service under the Medical Act, 1950. Vacant now.

Applications, stating full details and giving 2 names for reference, should be addressed, immediately, to the Hospital Secretary.

MID GLAMORGAN HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following medical staff vacancies :—

Neath General Hospital
SENIOR HOUSE OFFICER (pathology).
HOUSE SURGEONS.
HOUSE PHYSICIAN.

Bridgend General Hospital
HOUSE SURGEONS.
HOUSE PHYSICIANS.

Port Talbot General Hospital
SENIOR HOUSE OFFICER (general surgery).

Applications, naming 2 referees, to be addressed to the Group Secretary of the Committee, 8, Wind-street, Neath.

MORECAMBE. QUEEN VICTORIA HOSPITAL. Senior HOUSE OFFICER (obstetrics and gynæcology). Post vacant now.

Applications, with names of 2 referees, to Group Secretary, Royal Lancaster Infirmary.

NEWMARKET GENERAL HOSPITAL. Applications are invited for the post of HOUSE SURGEON, vacant 27th July, 1957. Duties include surgical house charge of general surgical and some eye cases. Post resident and available for 6 months, recognised for pre-registration.

Applications, with copies of 3 testimonials, to the Medical Superintendent.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. Applications are invited for the whole-time non-resident appointment of REGISTRAR in the Department of Dermatology at the Royal Victoria Infirmary. The appointment is for 1 year in the first instance and is subject to the terms and conditions of service of hospital medical staff in the National Health Service.

Applications, giving full particulars and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.

Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE REGIONAL HOSPITAL BOARD. Locum REGISTRAR ANÆSTHETIST (whole-time), Hartlepools Group of hospitals for period of 2–3 months. Main hospitals : General (471 Beds), Cameron (73 Beds), Hartlepools (134 Beds). Single accommodation, or accommodation for man and wife, available.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, immediately.

NEWCASTLE REGIONAL HOSPITAL BOARD. Locum Tenens REGISTRAR PSYCHIATRIST (whole-time), Winterton Hospital, Sedgefield (2000 Beds), for approximately 1 month. Accommodation available.

Applications, with names and addresses of 3 referees, to Regional Psychiatrist, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, immediately.

NEWCASTLE REGIONAL HOSPITAL BOARD. East CUMBERLAND GROUP OF HOSPITALS. SENIOR REGISTRAR or REGISTRAR in Anæsthetics on Locum basis for a period of 6–8 weeks required immediately.

Applications, naming 3 referees, to Senior Administrative Medical Officer, 72, Warwick-road, Carlisle.

NORWICH. NORFOLK AND NORWICH HOSPITAL. Applications are invited for the following appointments vacant 1st August, 1957. All are pre-registration posts.

(1) Norfolk and Norwich Hospital, Norwich

HOUSE PHYSICIANS (2) (Male or Female). Duties entirely general medical.

HOUSE SURGEON (Male or Female). Post recognised for Final F.R.C.S. examination requirements. Duties entirely general surgical.

JUNIOR CASUALTY OFFICER (Male or Female). 2 Casualty Officers employed in the department.

OBSTETRIC HOUSE SURGEON (Male or Female). Post recognised for Final D.Obst.R.C.O.G. examination requirements.

JUNIOR ORTHOPÆDIC HOUSE SURGEON (Male or Female). 2 Orthopædic House Officers employed in the department.

(2) Jenny Lind Hospital for Children, Norwich

HOUSE PHYSICIAN (Male or Female), at the Jenny Lind Hospital for Children, which forms the entire Pædiatric Department of the United Norwich Hospitals. The duties are under the direct supervision of the Consultant staff of the Norfolk and Norwich Hospital. Post recognised for D.C.H. examination requirements.

HOUSE SURGEON (Male or Female) at the Jenny Lind Hospital for Children, which forms the entire Pædiatric Department of the United Norwich Hospitals. The duties are under the direct supervision of the Consultant staff of the Norfolk and Norwich Hospital.

(3) West Norwich and Norwich Isolation Hospitals, Norwich

HOUSE PHYSICIANS (3) (Male or Female). Duties include acute medical, geriatric and infectious diseases. The beds at these Units are under the control of the Consultant Physicians of the Norfolk and Norwich Hospital, and the successful candidate will be required to undertake general medical duties under their supervision.

(4) West Norwich Hospital, Norwich

HOUSE SURGEONS (2) (Male or Female). Post recognised for Final F.R.C.S. examination requirements. Duties general surgical and including burns and plastic work. The beds at this Hospital are under the control of the Consultant staff of the Norfolk and Norwich Hospital.

(5) Norfolk and Norwich Hospital, Norwich

Applications are also invited for the following appointments vacant 1st August, 1957 :—

SENIOR CASUALTY OFFICER AND HOUSE SURGEON to the Septic Block (Male or Female), Senior House Officer status. 2 Casualty Officers employed in the department. Recognised for Final F.R.C.S. examination requirements.

SENIOR ORTHOPÆDIC HOUSE SURGEON (Male or Female), Senior House Officer status. 2 Orthopædic House Officers employed in the department.

SENIOR HOUSE OFFICER ANÆSTHETIST (Male or Female), Senior House Officer status. 2 House Officers employed in the department. Post recognised for D.A. and F.F.A.R.C.S. examination requirements.

Membership of a Medical Defence Society is a condition of appointment in each case.

Applications, giving full details with names of 2 referees, to Group Secretary, Hospital Management Committee, St. Stephen's-road, Norwich, by 6th July, 1957.

NOTTINGHAM AND MIDLAND EYE INFIRMARY. Required, SENIOR HOUSE OFFICER, duties to commence on 1st July, 1957. Salary and conditions of service in accordance with Ministry regulations.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary, General Hospital, Nottingham.

NOTTINGHAM AND MIDLAND EYE INFIRMARY. (Recognised training hospital for D.O.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (ophthalmology) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 8th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

NOTTINGHAM. HIGHBURY HOSPITAL, Bulwell, NOTTINGHAM. Applications are invited for SENIOR HOUSE OFFICER. Obstetrical and Gynæcological Department of 41 obstetric beds, 11 gynæcological beds and a small block for puerperal pyrexia. Duties to commence on 1st August, 1957. The Hospital is recognised for the M.R.C.O.G. (obstetrics only). Previous obstetrics experience required.

Applications, stating age, qualifications, experience and nationality, together with copies of recent testimonials, to be sent to the Secretary.

NOTTINGHAM. HIGHBURY HOSPITAL, Bulwell, NOTTINGHAM. SENIOR HOUSE OFFICER (medical), required. The successful candidate will, in addition to medical duties, have an opportunity of assisting in the Obstetric Unit. This post will be accepted as a general medical appointment entry to the M.R.C.O.G. examination.

Apply in writing, stating age, qualifications and experience, together with copies of testimonials, to the Hospital Secretary.

NOTTINGHAM GENERAL HOSPITAL. Resident pre-registration or registered HOUSE SURGEONS required immediately, 30th June and 31st July.

Applications, stating age, qualifications and nationality, together with copies of testimonials, to be sent to the Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Resident Pre-registration HOUSE PHYSICIANS required 31st July.

Applications, stating age, qualifications and nationality, together with copies of testimonials, to be sent to the Group Secretary.

OXFORD REGIONAL HOSPITAL BOARD. Registrar in General Medicine to the Kettering Group of hospitals with duties mainly at Kettering General Hospital. The appointment will be for 1 year and eligible for extension to 2 years. Single accommodation is available.

Applications on forms obtainable from the Secretary, Registrar Committee, 43, Banbury-road, Oxford, must reach him by 20th July.

OXFORD. WARNEFORD AND PARK HOSPITALS. Locum RESIDENT SENIOR HOUSE OFFICER required from 15th July till 21st August. Psychiatric experience desirable but not essential.

Apply immediately to the Physician-Superintendent, Warneford Hospital, Oxford.

PLYMOUTH. SOUTH DEVON AND EAST CORNWALL HOSPITAL.

HOUSE SURGEON (pre-registration post), vacant 23rd July, 1957. Recognised for the F.R.C.S. Freedom Fields Section.

HOUSE SURGEON (pre-registration post), vacant 1st July, 1957. Recognised for the F.R.C.S. Devonport Section.

Applications, stating age, nationality, and experience, with names of 3 referees, to be sent to the undersigned as soon as possible.

F. HALL Deputy Group Secretary, Plymouth, South Devon and East Cornwall General Hospital Group. 7, Nelson-gardens, Stoke, Plymouth.

PONTEFRACT GENERAL INFIRMARY. House Surgeon required. This is an approved pre-registration post under Medical Act, 1950, but applications will be considered from fully registered practitioners. Hospital approved under F.R.C.S. regulations and provides excellent surgical experience. Post vacant 20th July, 1957. Married accommodation available.

Applications to the Secretary, Pontefract and Castleford Hospital Management Committee, Great Northern House, Salter-row, Pontefract, Yorkshire, as soon as possible.

PONTYPRIDD AND RHONDDA HOSPITAL MANAGE-MENT COMMITTEE.

East Glamorgan Hospital, Church Village, near Pontypridd (316 Beds and large Outpatient Department. Committee's Base Hospital serving population of 174,000. Recognised for D.Obst.R.C.O.G., F.R.C.S., D.C.H., F.F.A.R.C.S., D.A.)

SENIOR HOUSE OFFICER (obstetrics and gynæcology), vacant immediately.

SENIOR HOUSE OFFICER (anæsthetics), to commence 1st August, 1957.

SENIOR HOUSE OFFICERS (medicine), to commence 1st August, 1957.

SENIOR HOUSE OFFICER (pædiatrics), to commence 1st August, 1957.

2 HOUSE OFFICERS (medicine), to commence 1st August, 1957.

HOUSE OFFICER (pædiatrics), to commence 1st August, 1957.

4 HOUSE OFFICERS (surgery) (to include duties at Porth and District Hospital), to commence 1st August, 1957.

2 HOUSE OFFICERS (obstetrics), to commence 1st August, 1957.

Llwynypia Hospital, Llwynypia, Rhondda (50 acute medical beds : geriatric beds : serving area population of 112,000)

SENIOR HOUSE OFFICER (medicine), to commence 1st August, 1957. Person appointed will have part responsibility for the Group Infectious Diseases Hospital.

HOUSE OFFICER (medicine), to commence 11th August, 1957. To also undertake duties at the Group Infectious Diseases Hospital when required.

Applications, stating age, qualifications and experience, together with copies of 2 recent testimonials, to be sent to the Group Secretary, Courthouse-street, Pontypridd.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE. PORTSMOUTH GROUP OF HOSPITALS. ANÆSTHETIST (Senior House Officer grade). Main duties at the Royal Portsmouth Hospital. Recognised for the F.F.A.R.C.S. Vacant 1st August, 1957.

Applications, stating age, experience and qualifications, together with the names of 2 referees, should be forwarded as soon as possible to E. H. HURST.

Saint Mary's Hospital, Milton-road, Portsmouth.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Queen Alexandra Hospital (87 surgical beds)

HOUSE SURGEON (pre-registration), vacant end of June.

HOUSE PHYSICIAN (78 medical beds) (pre-registration), vacant 30th July, 1957.

Saint Mary's Hospital (130 surgical beds).

HOUSE SURGEONS (pre-registration), vacant 30th July, 1957, and 1st August, 1957.

HOUSE PHYSICIANS (74 medical beds) (pre-registration), vacant 30th July, 1957 (1), and 31st July, 1957 (2).

Royal Portsmouth Hospital (61 medical beds)

HOUSE PHYSICIAN (pre-registration), vacant 4th July, 1957.

Applications, stating age, experience, and qualifications, together with the names of 2 referees, should be forwarded as soon as possible to E. H. HURST.

Saint Mary's Hospital, Milton-road, Portsmouth.

ROCHDALE AND DISTRICT HOSPITAL MANAGE-MENT COMMITTEE. SENIOR HOUSE OFFICER (medicine), resident, required at Birch Hill Hospital late July.

Apply at once to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale, Lancs.

ROCHDALE AND DISTRICT HOSPITAL MANAGE-MENT COMMITTEE. HOUSE OFFICER (surgery), pre-registration, required at Birch Hill Hospital and Rochdale Infirmary. 3 resident posts shortly available. Interviewing date 9th July, 1957.

Apply at once to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale, Lancs.

ROCHDALE AND DISTRICT HOSPITAL MANAGE-MENT COMMITTEE. Locum RESIDENT SURGICAL OFFICER (Registrar grade) required at Birch Hill Hospital for approximately 3 weeks in July.

Apply at once to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale.

ROCHDALE AND DISTRICT HOSPITAL MANAGE-MENT COMMITTEE. HOUSE OFFICERS (medicine), pre-registration, required at Birch Hill Hospital. 3 resident posts shortly available. Interviewing date 9th July, 1957.

Apply at once to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale, Lancs.

ROCHDALE GROUP OF HOSPITALS invites applications from newly qualified medical practitioners for 1 year rotating pre-registration posts. The first 6 months will be spen as HOUSE SURGEONS (2 months casualty, 4 months general surgery), and the second 6 months as HOUSE PHYSICIANS or OBSTETRICS AND GYNÆCOLOGICAL HOUSE SURGEONS. 3 posts vacant shortly. Interviewing date 9th July 1957.

Immediate applications to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale.

READING AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER for E.N.T. Department, Royal Berkshire Hospital, Reading (40 Beds). Post recognised for D.L.O.

Applications, stating age, nationality, experience and qualifications, together with names of 2 referees, should be sent to Group Secretary, 3, Craven-road, Reading.

READING AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER (area Accident and Orthopædic Department), vacant immediately. Recognised for F.R.C.S. Duties including work in area Casualty Department at Battle Hospital, Reading (300 Beds). Person appointed will work with Registrar and House Officers.

Apply, stating nationality, present post, and qualifications with dates, together with names of 2 referees, to Group Secretary, 3, Craven-road, Reading.

READING. BATTLE HOSPITAL. (391 Beds.) Applications are invited from registered medical practitioners for the post of RESIDENT JUNIOR HOUSE SURGEON in the Accident and Orthopædic Department. Post vacant 1st August. F.R.C.S. recognised. Also casualty duties.

Apply, stating age, qualifications with dates, nationality, present post, with 1 copy of recent testimonial, to Hospital Secretary.

READING COMBINED HOSPITALS. Area Department OF OBSTETRICS AND GYNÆCOLOGY. (100 Beds.) Applications are invited from registered medical practitioners for the resident post of HOUSE SURGEON to the above Department. The appointment, which is vacant on 1st July, 1957, is for 1 year, with 6 months gynæcology at the Royal Berkshire Hospital, and 6 months in the Maternity Unit at Battle Hospital. Both appointments are recognised for the Diplomas of the Royal College of Obstetricians and Gynæcologists.

Write, stating age and qualifications with dates, nationality, and present post, with copy of 1 recent testimonial, to Secretary, Royal Berkshire Hospital, Reading.

REDHILL. EAST SURREY HOSPITAL, Shrewsbury-road, REDHILL, SURREY. SENIOR HOUSE OFFICER (Male), mainly surgical. Post vacant immediately.

Apply to the Hospital Secretary.

RHYMNEY AND SIRHOWY VALLEYS HOSPITAL MANAGEMENT COMMITTEE.

St. James Hospital, Tredegar, Mon. (38 general medicine, 75 chronic sick, and 43 obstetric beds). Married quarters

HOUSE PHYSICIAN (from 5th August).

OBSTETRIC HOUSE OFFICER (30th July).

Tredegar General Hospital (20 miles from Newport, Mon., and 24 from City of Cardiff ; 6 miles from the Vale of Usk). Surgical Unit of 50 Beds with also 6 orthopædic beds under daily supervision of Consultant Surgeon and visiting supervision of Orthopædic Surgeon. Busy Outpatient, Casualty, and Radiology Departments. Married quarters

HOUSE SURGEON (1st August).

Caerphilly District Hospital, Caerphilly, Glam. acute general hospital—228 Beds), 6 miles from City of Cardiff. Married quarters may be available

SENIOR HOUSE OFFICER (immediate) on general surgical wards.

HOUSE SURGEONS (1st August)—2 vacancies.

HOUSE PHYSICIAN (1st August).

HOUSE OFFICER (obstetrics and gynæcology) (1st August).

Applications to the Group Secretary, Central Offices, Caerphilly-road, Ystrad Mynach, Hengoed, Glam.

RHYL. ROYAL ALEXANDRA HOSPITAL. (138 Beds.) Applications are invited for the appointment of :—

(*a*) Locum CASUALTY OFFICER (Senior House Officer grade) at the above Hospital until 9th July, 1957.

(*b*) CASUALTY OFFICER (Senior House Officer grade) from 1st August, 1957. Post recognised for F.R.C.S.

Applications, stating age, qualifications and experience, and nationality, accompanied by copies of 2 recent testimonials, should be sent immediately to the Group Secretary, Clwyd and Deeside Hospital Management Committee, " Rhianfa," Russell-road, Rhyl.

RHYL. ROYAL ALEXANDRA HOSPITAL. (138 Beds.) Applications are invited from pre-registration or registered medical practitioners for the post of HOUSE PHYSICIAN. Post tenable for 6 months as from 15th July, 1957.

Applications, with 2 testimonials, to be sent forthwith to Group Secretary, Clwyd and Deeside Hospital Management Committee, "Rhianfa," Russell-road, Rhyl.

RHYL. ROYAL ALEXANDRA HOSPITAL. (138 Beds.) Applications are invited from pre-registration or registered medical practitioners for the post of HOUSE SURGEON. Post tenable for 6 months as from 4th August, 1957. Recognised for F.R.C.S.

Applications, with 2 testimonials, to be sent forthwith to Group Secretary, Clwyd and Deeside Hospital Management Committee, "Rhianfa," Russell-road, Rhyl.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) RESIDENT HOUSE PHYSICIAN required from 24th July, 1957. Open to either pre-registration applicants or to fully qualified practitioners.

Apply immediately to Group Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) ORTHOPÆDIC HOUSE SURGEON (resident) required in the Orthopædic and Accident Unit immediately. The service consists of 100 beds equally divided between traumatic surgery and "cold" orthopædics. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications to be sent to Group Secretary, Romford Hospital Management Committee, Oldchurch Hospital.

ROMFORD. OLDCHURCH HOSPITAL. Anæsthetic REGISTRAR required as holiday Locum immediately.

Apply for further particulars by letter or phone to Medical Superintendent.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) GYNÆCOLOGICAL HOUSE SURGEON (Male or Female), required. Unit comprises 35 gynæcological and 6 maternity beds. Resident post open to either pre-registration applicants or to fully qualified practitioners.

Applications to Medical Superintendent as soon as possible. Hospital may be seen by arrangement (Tel. Romford 7711).

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) RESIDENT HOUSE OFFICER (general surgery) required from 30th July, 1957. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications should be forwarded immediately to Medical Superintendent, stating also names of 2 referees.

ROMFORD, ESSEX. VICTORIA HOSPITAL. (99 Beds.) RESIDENT HOUSE SURGEON (Male) required immediately. (Not pre-registration appointment.)

Applications should be forwarded to the Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

ROTHERHAM HOSPITAL, Doncaster Gate, Rotherham. (161 Beds. Recognised for the F.R.C.S.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT SURGICAL REGISTRAR required on 2nd September. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 8th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

RYDE. ROYAL I.W. COUNTY HOSPITAL. Isle of Wight GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN required (pre-registration post), vacant 22nd July.

Applications, with names of 2 referees, to Hospital Secretary not later than 13th July.

SHREWSBURY. CROSS HOUSES HOSPITAL. (34 maternity beds.) OBSTETRIC HOUSE SURGEON (pre-registration post), vacant immediately.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SHREWSBURY. ROYAL SALOP INFIRMARY/COPTHORNE HOSPITAL. (500 Beds.) HOUSE PHYSICIAN (pre-registration or otherwise), vacant 1st August, 1957.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SHREWSBURY. ROYAL SALOP INFIRMARY/COPTHORNE HOSPITAL. (500 Beds.) HOUSE SURGEON, vacant 1st August, 1957. Pre-registration candidates eligible. Recognised for the F.R.C.S.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SHEFFIELD. WHARNCLIFFE HOSPITAL. (128 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time NON-RESIDENT SURGICAL REGISTRAR required with additional orthopædic duties. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 8th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. ROYAL HOSPITAL UNIT. Applications invited for the following posts:—

(*a*) NON-RESIDENT REGISTRAR or SENIOR HOUSE OFFICER in General Medicine. Post vacant 23rd September, 1957. Grade according to qualifications and experience.

Closing date for applications 13th July.

(*b*) SENIOR HOUSE OFFICER to the Medical Professorial Unit. Post vacant 1st September.

Closing date for applications 15th July.

Applications for the above posts should state age, qualifications, and experience, give the names of 3 referees, and be sent to:—

For post (*a*) The Chief Administrative Officer, The United Sheffield Hospitals, West-street, Sheffield, 1.

For post (*b*) Superintendent, Royal Hospital, Sheffield, 1.

SHEFFIELD. UNITED SHEFFIELD HOSPITALS BOARD OF GOVERNORS AND SHEFFIELD REGIONAL HOSPITAL BOARD. Reciprocal Training Scheme for Senior Registrars. 2 Whole-time SENIOR REGISTRARS in Radiology required. 1 with initial tenure of appointment at the City General Hospital, Sheffield, and the Barnsley Group of hospitals. 1 with initial tenure of appointment at the Leicester Royal Infirmary. Candidates should hold a Diploma in Diagnostic Radiology. Appointment for 1 year in first instance and renewable thereafter annually. The successful candidates will be transferred to the Teaching Hospitals for the second phase of the appointment, in accordance with arrangements under the Reciprocal Training Scheme. Renewal of appointment and transfer to the Teaching Hospitals will be subject to satisfactory work and progress.

Further details and form of application from the Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, 10. Forms to be returned by 15th July, 1957.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT SENIOR REGISTRAR in Children's Psychiatry required. The post, intended to give experience with a view to specialising in children's psychiatry, is attached to the Mapperley Hospital, Nottingham, but is integrated with the child guidance clinics of the Nottingham City and County Councils. D.P.M. essential. A flat is available. Appointment for 1 year in first instance, reviewable annually.

Application forms and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 8th July, 1957.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in Orthopædic Surgery (resident or non-resident) to fill a vacancy in the approved trainee establishment in the Tunbridge Wells Group of hospitals for duties mainly at Pembury Hospital. There is a wide variety of short- and long-stay work and fractures; the post is recognised for the F.R.C.S. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales), and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 13th July, 1957.

SOUTHAMPTON GENERAL HOSPITAL. (471 Beds.) RESIDENT HOUSE SURGEON required. Pre-registration candidates eligible.

Applications, with copies of recent testimonials, should be forwarded to Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics) for the Anæsthetic Department of the Southampton Group of hospitals. Special facilities for working for F.F.A.R.C.S. and D.A.

Applications, with copies of testimonials, should be forwarded as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON GROUP OF HOSPITALS. South West METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of Whole-time ANÆSTHETIC REGISTRAR to the above Group for work in the general and special units. Special facilities for working for Primary or Final F.F.A.R.C.S.

Forms of application may be obtained from the undersigned, to whom they should be returned not later than 10th July, 1957.

FRANK JENNINGS, Group Secretary,
Southampton Group Hospital Management Committee.
Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL (278 Beds), AND SOUTHAMPTON GENERAL HOSPITAL (471 Beds). SENIOR HOUSE OFFICER (E.N.T.) required in August. This post is recognised for the F.R.C.S. (Eng.) and D.L.O. examinations and provides experience in all branches of E.N.T. work. The Group includes a diagnostic and distributing Hearing Aid Centre.

Applications, with copies of recent testimonials, should be forwarded as soon as possible, to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds.) ORTHOPÆDIC HOUSE SURGEON required. Post recognised for Pre-registration Service and tenable for 6 months. The Hospital is the centre to which all trauma from a large industrial town and port is directed thus providing excellent experience in the treatment of traumatic conditions; patients with orthopædic conditions are also drawn from a wide area.

Applications, with copies of testimonials, should be sent as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR at Stratheden Hospital, Cupar, Fife. During the tenure of the post opportunities for interchange of duty and training at other centres in the Region may be available under the joint training scheme of the South-Eastern Regional Hospital Board and the Department of Psychological Medicine of the University of Edinburgh. Residence is available.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 20th July, 1957.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in Surgery at Edenhall Hospital, Musselburgh.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 20th July.

SCOTLAND. NORTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the post of REGISTRAR or SENIOR REGISTRAR in Dermatology at the Aberdeen Royal Infirmary. The appointment will be filled in either of these grades according to the experience and qualifications of the applicant. The post will include some duties in the Venereological Department.

Applications, giving the names of 2 referees, should be submitted by 19th July, 1957, to the Secretary, North-Eastern Regional Hospital Board, Scotland, 1, Albyn-place, Aberdeen, from whom further particulars may be obtained.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments, which will be for 1 year in the first instance :—

SENIOR REGISTRAR in Medicine based at the Royal Alexandra Infirmary, Paisley.

REGISTRAR in Medicine based at the Western Infirmary, Glasgow.

REGISTRAR in E.N.T. Surgery for duties on a rotational basis at the Ear, Nose and Throat Hospital and the Western Infirmary, Glasgow.

2 REGISTRARS in E.N.T. Surgery based at the Royal Infirmary, Glasgow, 1 for duties at Law Hospital, Carluke.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, by 13th July, 1957.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Special Training Scheme. Applications are invited for the post of REGISTRAR in Psychiatry, the appointment to be held for 1 year at the Psychiatric Unit of the Southern General Hospital under the direction of the Professor of Psychological Medicine of the University of Glasgow. The second year is to be spent at a mental hospital or mental hospitals in the region. The aim is to provide a comprehensive training in all branches of psychiatry. Candidates will be selected to attend the Postgraduate Course in Psychiatry which will be provided by the University of Glasgow from January to June, 1958. It is hoped to advertise a similar post in 6 months time.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, by 13th July, 1957.

SOUTHEND-ON-SEA GENERAL HOSPITAL. Locum PÆDIATRIC REGISTRAR required from 14th July to 3rd August, 1957, inclusive.

Applications, &c., to be sent to the undersigned as soon as possible. J. C. FIELD, Secretary.

SOUTHEND-ON-SEA GENERAL HOSPITAL. Locum ORTHOPÆDIC REGISTRAR required from 13th July to 11th August, 1957, inclusive.

Applications, &c., to be sent to the undersigned as soon as possible. J. C. FIELD, Secretary.

ST. ASAPH HOSPITAL, St. Asaph. Appointment of HOUSE OFFICER. Duties divided between ophthalmology (16 Beds), E.N.T. (12 Beds) and oral surgery (4 Beds).

Applications, stating age, qualifications and experience accompanied by 2 recent testimonials, to be sent forthwith to the Group Secretary, Clwyd and Deeside Hospital Management Committee, " Rhianfa," Russell-road, Rhyl.

ST. HELENS AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. The following Resident House Officer posts become vacant on 1st September, 1957.

St. Helens Hospital (196 Beds)
HOUSE PHYSICIAN.
HOUSE SURGEONS (2).

Whiston Hospital, Prescot (892 Beds)
HOUSE PHYSICIANS (3).
HOUSE PHYSICIAN (pædiatric).
HOUSE SURGEONS (2).
HOUSE SURGEON (obstetrics).

The above posts are recognised for Pre-registration Service. The surgical posts are recognised for the F.R.C.S. examinations, and the pædiatric post is recognised for the D.C.H. examination.

Applications, stating age, date of qualification and experience, and giving 2 names for reference, should be forwarded to the Group Secretary, Whiston Hospital, Prescot, immediately. Please state for which post application is made.

ST. HELENS AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. ECCLESTON HALL HOSPITAL (75 Beds), **DELPH LANE HOSPITAL, WHISTON** (34 Beds). Applications are invited from fully or provisionally registered practitioners for the appointment of HOUSE PHYSICIAN to Eccleston Hall and Delph Lane Hospitals. The appointment may be made in the grade of Senior House Officer, dependent on the qualifications and experience of the applicant. The appointment is approved as a Pre-registration Service post. The person appointed will work under the supervision of the Consultant Chest Physician for the Group. The work comprises all types of tuberculosis and includes chest clinic work. Good residential accommodation for a single person, male or female, is available. The post may be non-resident, subject to residence within reasonable distance from the Hospitals.

Applications to be forwarded to—

N. RICHARDS, Group Secretary.

Whiston Hospital, Prescot.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. Applications invited for HOUSE OFFICER (medical), vacant early July. Recognised pre-registration post.

Detailed applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. HOUSE PHYSICIAN (general medicine) with dermatology. Vacant early July. Pre-registration post.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) HOUSE OFFICER (general surgery) required. Pre-registration post. Hospital recognised for F.R.C.S.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STAFFORD. STAFFORDSHIRE GENERAL INFIRMARY. (175 Beds—Recovery Unit 32 Beds.) HOUSE SURGEON (pre-registration post), vacant 25th July. At end of service the successful applicant will be considered for appointment to a pre-registration post of House Physician if he or she has not held such an appointment.

Applications to Group Secretary, Stafford Hospital Management Committee, 13, Foregate-street, Stafford.

STAFFORD. STAFFORDSHIRE GENERAL INFIRMARY. (175 Beds—Recovery Unit 32 Beds.) HOUSE PHYSICIAN (pre-registration post), vacant 22nd July. At end of service the successful applicant will be considered for appointment to a pre-registration post of House Surgeon if he or she has not held such an appointment.

Applications to Group Secretary, Stafford Hospital Management Committee, 13, Foregate-street, Stafford.

SUNDERLAND AREA HOSPITAL MANAGEMENT COMMITTEE. RESIDENT ANÆSTHETIST is required for duties at hospitals in the above Group. Senior House Officer grade. Post vacant immediately. The post offers good practical experience under the supervision of the visiting Anæsthetists. The hospitals are recognised for the F.F.A.R.C.S. and the D.A. In addition every opportunity is given to attend lectures at the neighbouring university 12 miles away.

Apply to the Group Secretary, Sunderland Area Hospita Management Committee, General Hospital, Sunderland, naming 2 referees.

SUTTON-IN-ASHFIELD. KING'S MILL HOSPITAL. (172 Beds.) **SHEFFIELD REGIONAL HOSPITAL BOARD.** Whole-time RESIDENT SURGICAL REGISTRAR required. Apart from the Surgical Unit there are also E.N.T. and Gynæcological Units at this Hospital. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 8th July, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SWANSEA. MORRISTON HOSPITAL. (501 Beds.) GLANTAWE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER in the Casualty Department of the above Hospital.

Full particulars, stating age, qualifications, and experience, together with copies of 2 recent testimonials, should be sent to the Medical Superintendent of the Hospital.

T. E. JONES, Group Secretary.

SWANSEA. MORRISTON HOSPITAL. (501 Beds.) GLANTAWE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER in the Department of Neurosurgery at the above Hospital. The department is the centre for neurosurgery for South West Wales and the post offers facilities for the study of neurology for those studying for higher qualifications.

Applications, together with copies of 2 recent testimonials, should be forwarded to the Medical Superintendent of the Hospital. T. E. JONES, Group Secretary.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications invited for the appointment of SENIOR HOUSE OFFICER as Casualty Officer and Orthopædic House Surgeon at Great Western Hospital, Swindon, vacant now. Post recognised by R.C.S. for 6 months of years training under Fellowship regulations. Work of Accident and Orthopædic Centre (Wingfield Morris Orthopædic Hospital), Oxford, includes large number of industrial injuries. Salary £819 10s. p.a., less charge for residential emoluments.

Full details and names of 3 referees to Secretary, 7, Okus-road, Swindon, Wilts, immediately.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SWINDON HOSPITALS. Applications invited for post of RESIDENT HOUSE PHYSICIAN in acute Medical Unit of 64 Beds at St. Margaret's Hospital. Recognised for training under pre-registration internship regulations and vacant on 5th July, 1957.

Full details, with names of 3 referees, to Secretary, 7, Okus-road, Swindon, immediately.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications invited for post of HOUSE OFFICER in Gynæcological Department at St. Margaret's Hospital, Swindon. Vacant 31st July. Post is tenable for 6 months. Offers good experience and is recognised for the M.R.C.O.G. By arrangement the appointment can be followed by further 6 months post in the Obstetric Department.

Applications to Secre'ary, 7, Okus-road, Swindon, as soon as possible.

TAPLOW, near MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. HOUSE SURGEON required for Unit of Obstetrics and Gynæcology. Vacant 4th August. Post recognised for M.R.C.O.G.

Applications, stating age, experience and qualifications with dates, with copies of 2 testimonials, to Secretary.

TAUNTON AND SOMERSET HOSPITAL. Musgrove PARK AND EAST REACH BRANCHES. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics), vacant now. This Hospital also possesses a Junior Hospital Medical Officer post in anæsthetics and candidates for this Senior House Officer post will be eligible for promotion to the more senior post after a period of 12 months.

Applications, stating age, qualifications and experience, together with the names of 2 referees, should be forwarded to the Group Secretary, Taunton Hospital Management Committee, Musgrove Park Hospital, Taunton.

WAKEFIELD. PINDERFIELDS GENERAL HOSPITAL. Applications invited for position of SENIOR HOUSE OFFICER in Thoracic Surgery Department. Salary £819 10s. p.a. £150 p.a. charged for accommodation.

Written applications, giving full personal particulars, details of experience, and 2 names and addresses for reference, to—

W. BOWRING, Group Secretary.

Pinderfields General Hospital, Wakefield.

WALSALL HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following appointments, vacant 1st August :—

Manor Hospital (333 Beds)
HOUSE SURGEONS (2 vacancies).
General Hospital (181 Beds)
HOUSE SURGEONS (2 vacancies).

Recognised pre-registration.

Applications, together with names of 2 referees, to Group Secretary, Walsall General (Sister Dora) Hospital.

WALSALL HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following appointments, vacant 1st August :—

Manor Hospital (333 Beds)
HOUSE PHYSICIANS (2 vacancies).
General Hospital (181 Beds)
HOUSE PHYSICIAN (1 vacancy).

Recognised pre-registration.

Applications to Group Secretary, Walsall General (Sister Dora) Hospital, together with names of 2 referees.

WALSALL HOSPITAL MANAGEMENT COMMITTEE. MANOR HOSPITAL, WALSALL. PÆDIATRIC HOUSE PHYSICIAN required : recognised for D.C.H., also pre-registration.

Applications to Group Secretary, Walsall General (Sister Dora) Hospital, together with names of 2 referees.

WARRINGTON INFIRMARY. (172 Beds.) Applications are invited for the post of RESIDENT ANÆSTHETIST (Male or Female) (graded as Senior House Officer), vacant 1st July. The Hospital is recognised for the D.A. examination. Salary is £819 10s. p.a., less a deduction of £150 p.a. for residential emoluments.

Applications, stating qualifications and experience, should be sent to— HENRY L. BOOT, Group Secretary,

Warrington and District Hospital Management Committee.
c/o General Hospital, Warrington, Lancs.

WATFORD, HERTFORDSHIRE. HOLYWELL HOSPITAL. (82 Beds.) Applications are invited for the post of RESIDENT MEDICAL OFFICER (Junior Hospital Medical Officer grade). Care of infectious diseases 34 beds, tuberculosis 32 Beds, chest medicine 16 Beds. The duties are light, but a wide variety of clinical material is seen at the Hospital. Ample time available for reading. The Hospital is within reach of London Teaching classes.

Applications to Dr. C. W. C. KARRAN, Shrodells Hospital, Watford, Herts, as soon as possible.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL HOSPITAL. (208 Beds.) ORTHOPÆDIC HOUSE SURGEON (with certain casualty duties) required. Post recognised for F.R.C.S.(Eng.) examination. Intermediate or Senior post depending on experience for Orthopædic Unit (30 Beds). The Orthopædic Service is in charge of a Consultant and Registrar closely associated with a Postgraduate Teaching Hospital.

Applications, with copies of 2 testimonials, to the Administrator.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL HOSPITAL. (208 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital. This is a pre-registration post and is recognised for F.R.C.S. Salary according to the National Health Service scale.

Applications, with copies of recent testimonials, to the Administrator.

WATFORD. SHRODELLS HOSPITAL. (General Hospital —320 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER to the Geriatric Unit, a modern unit of 180 Beds. Adequate time for reading. The Hospital is within reach of London teaching classes.

Applications, together with copies of 2 testimonials, should reach the Medical Officer-in-charge as soon as possible.

WELSH REGIONAL HOSPITAL BOARD.

SURGICAL REGISTRAR (orthopædics) to serve Cardiff Hospital Management Committee. Based at Prince of Wales Hospital, Rhydlafar, near Cardiff (200–300 Beds). Hospital is Regional Orthopædic Centre for South Wales area. Married accommodation available.

REGISTRAR (general surgery), based at Bridgend General Hospital, Bridgend (381 Beds), to serve Mid Glamorgan Hospital Management Committee. May also be expected to serve other hospitals in Group. Hospital recognised for F.R.C.S. Resident/non-resident.

REGISTRAR (general surgery), based West Wales General Hospital, Carmarthen. Resident.

Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WEST BROMWICH AND DISTRICT GENERAL HOSPITAL. HOUSE SURGEON, vacant immediately. Pre-registration.

Applications, with 3 recent testimonials, to Group Secretary, West Bromwich and District Hospital Management Committee, Edward-street, West Bromwich.

WESTON-SUPER-MARE GENERAL HOSPITAL. CASUALTY OFFICER (Senior House Officer grade) required for the above Hospital. The appointment is recognised for F.R.C.S. examinations.

Applications, stating age, qualifications, and experience, together with names and addresses of 2 referees, should be addressed to Group Secretary, Weston-super-Mare Hospital Management Committee.

WEST FIFE HOSPITALS BOARD OF MANAGEMENT. NORTHERN HOSPITAL, Leys Park-road, DUNFERMLINE. (General medical.) Applications are invited for the appointment of JUNIOR HOSPITAL MEDICAL OFFICER (resident). Duties will lie mainly in the acute Medical Unit (70 Beds) but will include duties in the Geriatric Assessment Unit of 31 Beds. 2 House Physicians employed. Salary £852 10s.–£1182 10s. p.a., from which a deduction will be made for board and lodging of £170 p.a.

Applications, giving names of 3 referees, should be lodged with the Group Medical Superintendent within 14 days.

WEST DORSET GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for 2 resident 6-monthly posts of HOUSE SURGEON (Male or Female) at :—

(*a*) Weymouth and District Hospital (124 Beds).
(*b*) Dorset County Hospital, Dorchester (109 Beds).

Both posts are recognised for the F.R.C.S. examination ; approved for Pre-registration Service, and become vacant 1st August, 1957.

Applications, stating age, qualifications, experience, and nationality, together with copies of testimonials, to the Group Secretary, West Dorset Hospital Management Committee, Damers-road, Dorchester, Dorset, immediately.

WIGAN AND LEIGH HOSPITAL MANAGEMENT COMMITTEE. MANCHESTER REGIONAL HOSPITAL BOARD. REGISTRAR in Anæsthetics required with main duties at Royal Albert Edward Infirmary, but to be resident at Billinge Hospital. Recognised for D.A. and F.F.A.R.C.S. Experience available in all branches of anæsthesia including thoracic surgery.

Applications to Secretary, Knowsley House, Wigan.

WIGAN AND LEIGH HOSPITAL MANAGEMENT COMMITTEE.

Royal Albert Edward Infirmary, Wigan
3 HOUSE SURGEONS.
HOUSE PHYSICIAN.
Leigh Infirmary
HOUSE SURGEON.
HOUSE PHYSICIAN.
Wholley Hospital
HOUSE PHYSICIAN.

All pre-registration posts—becoming vacant during July.

Applications, with names of 2 referees, to the Secretary, Knowsley House, Wigan.

WREXHAM. MAELOR GENERAL HOSPITAL. (591 Beds.) Applications are invited for the post of HOUSE PHYSICIAN at the above Hospital to commence duties on 1st August, 1957. The post is recognised for pre-registration purposes.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WREXHAM. MAELOR GENERAL HOSPITAL. (591 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital, to commence duties on 1st August, 1957. The appointment is recognised for the Diploma of F.R.C.S. (Eng. and Edin.) and is a pre-registration post.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WREXHAM. WAR MEMORIAL HOSPITAL. (230 Beds.) Applications are invited for the post of HOUSE PHYSICIAN at the above Hospital to commence duties on 1st August, 1957. The post is recognised for pre-registration purposes.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WREXHAM. WAR MEMORIAL HOSPITAL. (230 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital, to commence duties on 1st August, 1957. The appointment is recognised for the Diploma of F.R.C.S. (Eng. and Edin.) and is a pre-registration post.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WREXHAM (near). TREVALYN MANOR MATERNITY HOSPITAL, ROSSETT, near WREXHAM. (47 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital, to commence duties on 1st August, 1957. The Hospital is recognised by the Central Midwives Board as a Part II Midwifery Training School and deals with normal and abnormal midwifery.

Applications, stating age, qualifications and experience, together with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WINDSOR. KING EDWARD VII HOSPITAL. House PHYSICIAN required. Male or Female, for post vacant 11th August. Pre-registration post.

Applications, stating age, qualifications with dates, and nationality, with copies of 3 recent testimonials, to Secretary.

WINDSOR. KING EDWARD VII HOSPITAL. Casualty OFFICER required, Senior House Officer grade. Department forms part of Accident Service of Windsor Group. Duties include House Surgeon to E.N.T. and Eye Departments. Previous experience in treatment of acute injuries desirable.

Applications, stating age, qualifications with dates, nationality, with copies of recent testimonials, to Secretary.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOSPITAL. (315 Beds.) HOUSE SURGEON to the Senior Surgeon. Post vacant 16th August.

Applications, with copies of 2 testimonials, to the Group Secretary.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOSPITAL. (315 Beds.) HOUSE SURGEON (post recognised by Royal College of Surgeons) required for general surgery with some E.N.T. duties. Approved pre-registration post. Vacant 28th August.

Applications, with copies of 2 testimonials, to Group Secretary.

WOLVERHAMPTON GROUP. The Royal Hospital. JUNIOR PATHOLOGIST required. Salary in Junior Hospital Medical Officer grade. Resident or partly resident. Comprehensive service offering wide experience and training. Experience in specialty not essential. Post vacant shortly. Candidates may visit the Pathologist.

Applications to Group Secretary, The Royal Hospital, Wolverhampton, by 5th July, 1957.

YORK. NABURN AND BOOTHAM PARK HOSPITAL. YORK A AND TADCASTER HOSPITAL MANAGEMENT COMMITTEE. There will shortly be a vacancy for a JUNIOR HOSPITAL MEDICAL OFFICER in Psychiatry at this Hospital of 630 Beds including Health Service, Amenity and Private categories. The annual admission-rate is over 550 and the inpatient and outpatient work offers experience in all branches of psychiatry. Emphasis is laid upon the social factors in psychiatric illness; the Hospital is an integral part of the York Comprehensive Mental Health Service. Preference will be given to candidates who wish to avail themselves of the facilities offered to attend the D.P.M. Course at Leeds University.

Applications, giving details of career with the names of 3 referees, should be sent to the Physician-Superintendent, Bootham Park, York, not later than 12th July.

CHANNEL ISLANDS. JERSEY GENERAL HOSPITAL. Applications are invited for the post of MEDICAL OFFICER which will be vacant on 10th July, 1957, in the above Hospital. The appointment is for 6 months but is renewable for a further 6 months. Salary scale from £650 to £850 p.a., less £125 p.a. residential emoluments according to experience.

Early applications to be submitted to the President, Public Health Committee, General Hospital, Jersey, C.I.

CHANNEL ISLANDS. JERSEY GENERAL HOSPITAL. Applications are invited for the post of CASUALTY OFFICER which will be vacant on 1st September, 1957. The appointment is for 12 months, but is renewable for a further 12 months. Salary £850 p.a., less £125 p.a. for residential emoluments.

Applications to be submitted not later than 13th July, 1957, to the President, Public Health Committee, General Hospital, Jersey, C.I.

B.W.I. UNIVERSITY COLLEGE HOSPITAL OF THE WEST INDIES. Applications are invited for the post of REGISTRAR in the Department of Diagnostic Radiology at the above-named Teaching Hospital. Preference will be given to candidates holding a Diploma in Diagnostic Radiology. The successful candidate will be required to take up duties in October, 1957. The appointment will be for 1 year in the first instance subject to renewal. Salary will be in the scale of £900–£100–£1100–£1200–£100–£1500 p.a., depending on experience, and qualifications. If available, an unfurnished flat will be provided at a deduction of 5% of salary, otherwise a living-out allowance will be paid by the Board. Passage will be provided for 1 person only by sea from the country of recruitment.

Further information may be obtained from the Hospital Manager and Secretary, University College Hospital of the West Indies, Mona, P.O., Jamaica, B.W.I., to whom application, stating age, nationality, and details of qualifications and experience, together with 3 recent testimonials or the names and addresses of 3 referees, should be sent by 30th July, 1957.

B.W.I. UNIVERSITY COLLEGE HOSPITAL OF THE WEST INDIES. Applications are invited for 2 posts of REGISTRAR or SENIOR REGISTRAR in the Division of Obstetrics and Gynæcology at the above-named Teaching Hospital. These posts, which are resident, are recognised for training for Membership of the Royal College of Obstetricians and Gynæcologists. The successful candidates will be required to assume duties on 1st October and 1st November, 1957. The appointments will be for 1 year in the first instance. Salary is in the scale £900–£100–£1100–£1200–£100–£1500 p.a., depending on qualifications and experience. Single accommodation and board may be provided at a deduction from salary at the rate of £145 p.a., or, if available, an unfurnished flat may be provided at a rental of 5% of salary. Passages by sea will be paid from the country of recruitment for 1 person only for each appointment.

Further information may be obtained from the Hospital Manager and Secretary, University College Hospital of the West Indies, Mona, Jamaica, B.W.I., to whom applications, stating age, nationality, details of experience and qualifications, together with 3 recent testimonials or the names and addresses of 3 referees, should be sent not later than 30th July, 1957.

CANADA. ROYAL JUBILEE HOSPITAL, Victoria, BRITISH COLUMBIA. 1-year approved ROTATING INTERNESHIP in the above Hospital. Organised training programme. Stipend $175 per month, plus accommodation. Married internes may live out of the Hospital. 2 weeks vacation. British and American graduates only.

Applications or requests for further information to Medical Administrator, Royal Jubilee Hospital, Victoria, B.C., Canada.

U.S.A. CAMBRIDGE, MASSACHUSETTS. Applications are invited for the positions of RESIDENCIES in Anesthesia for a 2-year period beginning 1st July and 1st September, 1957. Salary $1800 first year and $3600 second year and full maintenance. Training in all branches of anesthesia. Affiliation with other hospitals.

Applications, stating age, nationality, qualifications, and experience, together with the names of their referees, should be forwarded to the Director of Anesthesiology, P.O. Box 89, Cambridge, Massachusetts. Travelling expenses to and from the U.S.A. will be paid. Particulars will be sent as soon as application is received. Please enclose recent photograph with application.

Public Appointments

BOROUGH OF ST. MARYLEBONE. Applications are invited from duly registered medical practitioners for the appointment of MEDICAL OFFICER OF HEALTH of the Metropolitan Borough of St. Marylebone and MEDICAL REFEREE of the St. Marylebone Crematorium, at an inclusive salary of £2445 p.a., rising by annual increments of £105 to £2865 p.a., plus car allowance of £100 p.a.

The official form of application and conditions of appointment may be obtained from the Town Clerk, Town Hall, St. Marylebone, W.1, to whom applications must be sent to arrive not later than Monday, 15th July, 1957. Canvassing will disqualify.

CIVIL SERVICE COMMISSION. Psychologists in the Civil Service. The Civil Service Commissioners invite applications for 6 posts: 2 in the Air Ministry—1 in the R.A.F. Institute of Aviation Medicine and 1 in the Scientific Adviser's Organisation—3 under the Prison Commission and 1 under the Admiralty for duties at the R.A.F. Institute of Aviation Medicine. The post under the Admiralty is in the Senior grade; the others are in the Basic grade. Both Men and Women may compete for the post under the Air Ministry at the R.A.F. Institute of Aviation Medicine, but for all other posts men only are eligible. Age: for Senior Psychologist at least 30 on 1st August, 1957; for Psychologist at least 21 and under 31 on that date, with extension for Regular Forces service. All candidates must possess 1 of the following qualifications:—

(*a*) A first or second class honours degree of a recognised University in which psychology was taken as a main subject.
(*b*) A higher degree in psychology.
(*c*) A Bachelor of Education degree of a Scottish University or of the University of Belfast.
(*d*) A postgraduate Diploma in Psychology, following at least 2 years systematic study.
(*e*) Fellowship of the British Psychological Society.
(*f*) Associateship of the British Psychological Society (subject to certain conditions).

Candidates taking the Final examination for (*a*), (*b*), (*c*), (*d*), in summer 1957 may be considered. Exceptionally a candidate without any of these qualifications may be accepted if he has at least 3 years responsible professional experience.

London salary (men): Senior Psychologist £1055–£1460; Psychologist £565 at age 21 up to £900 (women £882) at age 30. Men's scale maximum £1190. Women's rate, where lower, is being improved until equality with the men's scale is reached in 1961. Rates somewhat lower outside London. Promotion prospects. 5-day week generally.

Particulars and application forms from Secretary, Civil Service Commission, Burlington-gardens, London, W.1, quoting No. 75/57/11. Application forms should be returned by 10th July, 1957.

DUBLIN. LOCAL APPOINTMENTS COMMISSION. Position vacant. BACTERIOLOGIST under the Board of Public Assistance for the South Cork Public Assistance District. Essential qualifications include the M.D., M.Sc., D.Sc., M.R.C.P.I. or equivalent. Upper age limit: 50 years with extensions in certain cases. Salary scale: £1182–£1821. The person appointed may undertake, if offered, a University teaching appointment.

Application forms and particulars from the Secretary, 45, Upper O'Connell-street, Dublin. Latest time for receiving completed application forms 5 P.M. on 19th July, 1957.

EXETER. CITY AND COUNTY OF THE CITY OF EXETER. SCHOOL MEDICAL OFFICER AND ASSISTANT MEDICAL OFFICER OF HEALTH. The duties will be mainly in connection with the School Health and Child Welfare Services but the appointed candidate will assist in other sections of the Department. The successful candidate will gain administrative experience in school health work. The possession of a D.P.H. or D.C.H. would be an advantage. Whitley scales and conditions. Salary £1050–£50–£1200–£55–£1475. Commencing salary according to experience. Casual car user allowance.

Application forms from Dr. E. D. Irvine, Medical Officer of Health, and Principal School Medical Officer, 5, Southernhay-west, Exeter, to whom they should be returned not later than 8th July, 1957.

14th June, 1957. C. J. NEWMAN, Town Clerk.

MUNICIPAL COUNCIL OF NAKURU. Vacancy for suitably qualified MEDICAL OFFICER OF HEALTH in the Municipality of Nakuru, Kenya Colony, in the salary scale for Chief Officers—£1836 p.a.–£69–£2139 p.a. The appointment is pensionable and carries home leave entitlements.

Inquiries to the Town Clerk, P.O. Box 124, Nakuru, Kenya Colony.

HER MAJESTY'S OVERSEAS CIVIL SERVICE. PHYSICIAN required in British Guiana to take care of medical cases at the Public Hospital, Georgetown, and other hospitals, and to supervise work of all Government Medical Officers attached thereto. Candidates must have qualifications registrable in the United Kingdom and M.R.C.P. Appointment on permanent basis with pension (non-contributory) 1/600th of final pensionable emoluments for each completed month of service; or on contract for 3 years resident service with gratuity (taxable) of 22½% of salary for each 3 months service. Candidates in National Health Service may retain superannuation rights during their service abroad (up to 6 years) and receive gratuity (taxable) of 20% of salary on leaving oversea employment. (Only permanent officers are members of Her Majesty's Overseas Civil Service.) Salary £1600 a year plus non-pensionable allowance of £250 a year in lieu of consultation fees. Free unfurnished quarters or allowance of £100 a year in lieu. Generous home leave. Free passages on appointment for Officer, wife, and children under 18 years, not exceeding 5 persons in all. Assisted passages for Officer and wife on leave.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting No. BCD. 117/30/012).

HER MAJESTY'S OVERSEAS CIVIL SERVICE Trinidad. Applications for following posts invited from doctors with qualifications registrable in United Kingdom. D.P.H. and 3 years public health experience following Diploma required for (*a*), D.P.H. and 3 years postgraduate experience for (*b*), D.P.H. preferred for (*c*).

(*a*) MEDICAL OFFICERS (Grade A) (Public Health) for duties of Medical Officers of Health including public health administration, environmental sanitation, Maternity and Child Welfare Services, school health, communicable disease control, housing, &c., and implementation of Laws relating to public health. Salary scale £1500–£1600 a year. Consulting practice but not private practice permitted.

(*b*) MEDICAL OFFICERS (Grade B) (Public Health). Duties in the same fields as for (*a*) above. Salary scale £1400–£1500 a year. Consulting and private practice not permitted.

(*c*) MEDICAL OFFICERS (Grade C) (Public Health). Subordinate duties as in (*a*) and (*b*) above. Salary scale £950–£1350 a year. Consulting and private practice not permitted.

Appointments on permanent basis with pension (non-contributory); or on agreement; or from National Health Service with retention of superannuation rights (up to 6 years) and gratuity (taxable) of 20% of aggregate salary on completion of engagements. Only permanent officers are members of Her Majesty's Overseas Civil Service. Government quarters, if available, at low rental or allowance in lieu. Free passages for Officer, wife, and children under 18 years, not exceeding 5 persons in all and up to 3 on leave. Educational facilities available. Income-tax at local rates. Generous leave.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting No. BCD.117/38/020).

KERRY COUNTY COUNCIL. Surgical Registrar required. Applications are invited for the whole-time non-pensionable post of Registrar at the co. Hospital Tralee. Candidates must be between the ages of 24 and 40 on 1st July, 1957, and must have had 3 years experience (including 2 years satisfactory surgical experience) since qualification. Salary including temporary bonus is £862 10s.–£106 10s.–£1075 10s. p.a., plus £106 10s. p.a. for higher qualifications, and less deduction of £159 p.a. for emoluments: credit being given for previous experience as a Registrar up to a maximum of two years.

Application forms and full particulars may be had from the Secretary, Kerry County Council, Killarney, by whom applications will be received not later than Tuesday, 2nd July, 1957.

J. K. O'Hare County Secretary.

County Council Offices, Killarney, 19th June, 1957.

MIDDLESBROUGH. COUNTY BOROUGH OF MIDDLESBROUGH. SENIOR ASSISTANT MEDICAL OFFICER OF HEALTH AND SCHOOL MEDICAL OFFICER required. Applicants must be registered medical practitioners holding the D.P.H. or equivalent, and previous experience in public health, mental health, or in general practice, desirable. Work is under the direction of the Medical Officer of Health. Salary £1200–£50 (3)–£55 (5)–£1625 p.a.

Applications, with names of 3 referees, to the Medical Officer of Health, 26, Southfield-road, Middlesbrough, by 22nd July, 1957. E. C. PARR, Town Clerk.

WESTERN AUSTRALIA. STATE PUBLIC SERVICE. MENTAL HEALTH SERVICES. MEDICAL OFFICER (Child Guidance Clinic).

Salary range: £A2552–£A2622 (gross) p.a., plus £100 p.a. for possession of a Diploma in Psychiatry.

Qualifications: Candidates must possess a medical degree registrable in Western Australia and a postgraduate qualification in psychiatry.

Transport: A reasonable amount will be allowed for transport of appointee and dependent family to Western Australia provided bond is entered into to serve State for a period of at least 3 years.

Conditions of service: Superannuation benefits; long service leave (3 months on full pay after each 7 years of continuous service); cumulative sick leave and other benefits applicable to permanent public servants.

Applications in duplicate, stating age, marital status, qualifications, and experience, should be addressed by 25th July, 1957, to Official Secretary, Agent General for Western Australia, Savoy House, Strand, London, W.C.2.

YORKSHIRE. COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE. Joint appointment of SENIOR ASSISTANT COUNTY MEDICAL OFFICER AND SCHOOL MEDICAL OFFICER to the Maltby Urban District Council, the Rotherham and Kiveton Park Rural District Councils and the West Riding County Council. Applications are invited from registered medical practitioners, Men or Women, for the above post. The Senior Assistant County Medical Officer and School Medical Officer will be on the staff of the County Medical Officer's Department but will work under the administrative direction of the Divisional Medical Officer and the Medical Officer of Health, who is responsible for the day to day administration of practically all public health matters in the Division. The duties of the office will be mainly clinical in the School Health and Infant Welfare Services, but in addition to these duties the person appointed will be required to act for the Divisional Medical Officer and Medical Officer of Health in his absence, and will be appointed as Deputy Medical Officer of Health to the constituent Authorities. Candidates must be in possession of the D.P.H. or be nearing completion of training for the D.P.H. The scale of salary is at present £1150–£1575 p.a. Travelling and subsistence allowances according to the County Council's scale are payable in addition to salary. The post is superannuable and the successful applicant will be required to pass a medical examination as to physical fitness.

Forms of application can be obtained from the undersigned to whom they should be returned not later than 13th July, 1957. J. WOOD-WILSON, County Medical Officer.

County Hall, Wakefield.

RADIOTHERAPIST
required by
SASKATCHEWAN DEPARTMENT OF PUBLIC HEALTH
for
ALLAN BLAIR MEMORIAL CLINIC, REGINA

Salary range: $11,000–$13,500 per year (Exchange—£1 = $2.70 approximately).

Requirements.—Radiotherapist with D.M.R. (T.). A full range of therapeutic equipment is in use. A rotating cobalt unit will be installed in the near future. There is an active isotope laboratory. Beds are under the direct control of the Radiotherapist. There are approximately 850 new cancer cases seen annually.

How to apply.—For further information write Dr. T. A. WATSON, Director of Cancer Services for Saskatchewan, Cancer Clinic, University Hospital, Saskatoon, Canada. Applicants should refer to c/c4640.

General Practice

For an ***Executive Council post*** *(England and Wales) apply on form* E.C.16A *obtainable from the council. Mark envelope "Vacancy."*

BRISTOL EXECUTIVE COUNCIL. Applications invited to fill a General Medical Practice VACANCY which will arise on 30th September, 1957, urban. List at present approximately 4560. 1 or more applicants, separately or in partnership may be considered. Residence and surgery available for purchase. Apply before 5th July, 1957, on Form E.C.16A obtainable on application to the Clerk, Bristol Executive Council, 5, Alexandra-road, Bristol, 8. Please mark envelope "C."

KINGSWOOD NEIGHBOURHOOD: BASILDON NEW TOWN, ESSEX. Applications invited for VACANCY (urban) in above neighbourhood, which is under development. Not retirement or death vacancy. No list of patients. Subject to appropriate conditions, Initial Practice Allowance will be payable. Accommodation will be made available by agreement with the Basildon Development Corporation. Apply on Form E.C.16A by first post on 13th July, 1957, to—

E. BERGDAHL, Clerk of the Council.
Essex Executive Council, 131/3, Fillebrook-road, Leytonstone. E.11.

Miscellaneous

Esso Petroleum Company. A vacancy exists for a full-time Medical Officer, at the Esso Refinery, Fawley, near Southampton. Candidates must be well qualified, with good clinical experience and preferably under 40 years of age. Previous industrial experience not essential. Starting salary not less than £1650. Good pension scheme.—Full particulars may be obtained by writing to the Personnel Manager, Employee Relations Department, ESSO PETROLEUM COMPANY, 16, Charles II-street, London, S.W.1.

Locum wanted for Medical Superintendent, St. Lucy's Hospital, St. Cuthbert's Mission, Tsolo, Cape Province, from 1st March to 1st October, 1958. Duties comprise average 150 inpatients, daily outpatient service of approximately 30 patients. Applicant must have had 4 years experience, have a knowledge of obstetrics, anæsthetics, X-ray interpretation and emergency surgery. Salary (including cost-of-living allowance) £1200, plus £100 for each child. Rent-free house available. Nearest junior school 8 miles, senior school 40 miles. If applicant suitable and wishes, permanent post on staff might be considered.—Replies to Dr. VAN DER WALT, St. Lucy's Hospital.

Medical Graduate—Pharmaceutical Research. Applications are invited from medical graduates with an interest in the application of pharmaceutical research to medicine by an old-established British company of fine tradition, but with modern research facilities and outlook, and with headquarters in Edinburgh. The man appointed will be responsible to the Director in charge of research. His responsibilities will include the review of medical fields, liaison with research inside and outside the Company, organisation of clinical trials and advising on medical aspects of the Company's activities. A 5-day week and staff superannuation scheme are in operation.—Applications, with full details of qualifications and career, to Address, no. 304, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

John Wyeth & Brother Limited invite applications for the recently advertised post of Assistant Medical Director. Wide clinical experience is essential. Some research experience is desirable, but experience in the Pharmaceutical Industry is not important. The work includes advising the Company on new products and the arranging of clinical investigations. Industrial medical responsibilities are not included. The prospects are good and the post will interest those already earning about £2000 a year.—Apply in strict confidence to Medical Director, JOHN WYETH & BROTHER LIMITED, Clifton House, Euston-road, London, N.W.1.

Tanganyika. Medical Officer urgently required for Catholic Mission hospital. D.T.M. not essential.—Particulars from Dr. L. D. STIRLING, 17, Kensington-court, London, W.8.

"Pregnancy Diagnosis by the Xenopus Method," 24-hour service. Send specimens of urine and £1 1s. fee. Hæmatology, Biochemistry, Flame Photometry.—WELBECK BIOLOGICAL LABORATORIES, 26, Park-crescent, Portland-place, W.1 (MUSeum 5386–7).

Applicants for posts requiring testimonials copied or duplicated should communicate with MANTON SECRETARIAL SERVICE LTD., 98, Victoria-street, S.W.1 (Phone: VICtoria 0141), who are specialists in this kind of work.

Typewriting and Duplicating. First-class work at moderate prices by experienced medical typists. Electric machines.—SYBIL RANG, 21, Heath-street, Hampstead, London, N.W.3 (HAM 5329/0504).

PUBLISHED by the PROPRIETORS, THE LANCET LIMITED, 7, Adam Street, Adelphi, in the County of London.
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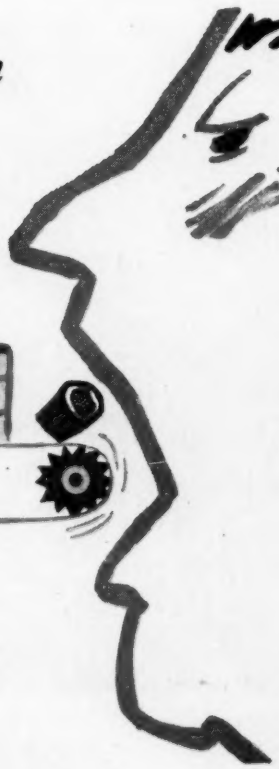
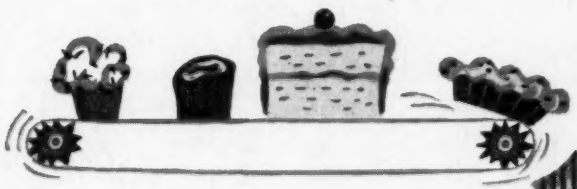
what's the use of temptation if you don't succumb to it?



For the between-meal nibbler every toothsome morsel is an irresistible temptation. 'Conveyor belt feeding' becomes a habit that punctuates his day with an endless series of 'little somethings'—most of them starchy and all of them fattening. With each surrender to temptation his girth grows greater and his will to resist is less.

'Dexedrine Spansule' capsules put temptation behind him by controlling his appetite all day long—*between meals as well as at mealtimes.* The single morning oral dose is easily remembered: between-meal snacks vanish as eating habits change, and *effective* weight reduction can begin.



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SUSTAINED RELEASE CAPSULES

control appetite in weight reduction

Smith Kline & French Laboratories Ltd., Coldharbour Lane, London SE5

SUDP126

Night attack

The angina patient goes to bed in fear and may wake in agony. Peritrate prophylaxis can ease his mind considerably. Since Peritrate is a *long-lasting* coronary vasodilator, a single dose affords protection for as long as 4 to 5 hours . . . a considerable part of the night. Peritrate will not abort attacks completely—but it prevents attacks or reduces their severity in up to 80% of cases. Exercise tolerance is increased, nitroglycerin intake is reduced and very few side-effects occur.

Active principles: Pentaerythritol tetranitrate 10 mg.

Packing: Bottles of 50 tablets and packs of 500.

PERITRATE WITH PHENOBARBITONE (Peritrate 10 mg. with Phenobarbitone 15 mg.) is also available, similarly packed.

Peritrate

Trade Mark

WILLIAM R. WARNER & CO. LTD., LONDON and EASTLEIGH